

## **PRELIMINARY REMARKS**

The Office Action dated July 28, 2004 does not respond to all of Applicants' arguments and factual data as to why all of Applicants' claims are fully enabled. Prior to final rejection Applicants are entitled to the Examiner's reasons why Applicants' arguments and factual evidence in support of Applicants' position are not found persuasive by the Examiner. A final rejection is improper without the Examiner's comments. To finally reject Applicants' claims without the missing Examiner's comments means that Applicants for the first time will, if at all, know of the Examiner's missing reasons either in a final rejection, the Examiner's Answer to Applicants' Brief on Appeal or in a Decision by the Board of Appeals. This will substantially disadvantage Applicants since after final rejection, Applicants have limited ability (or none at all) to introduce new arguments and evidence to rebut the reason for why Applicants non-responded to arguments and evidence do not overcome the rejections for lack of enablement.

The Examiner did not respond to Applicants' arguments and evidence in support of full enablement of all the claims as specifically indicated in the following list:

1. The article by Rao "Synthesis of Cuprate Superconductors" referred to in the Fifth Supplemental Amendment dated March 1, 2004 at page 119, lines 7-17, page 143, line 17 to page 150, line 17; and page 174, line 14 to page 176, line 4 from the bottom.
2. The Handbook of Chemistry and Physics Table of High Tc Superconductors referred to at page 176, line 3 from the bottom to page 178, last line of the Fifth Supplementary Amendment dated March 1, 2004.
3. Applicants' Remarks on the ancestral file history pages 179 to 183 of the Fifth Supplementary Amendment dated March 1, 2004.

4. Applicants' remarks on why Rejections under 35 USC 102 and 103 over the Asahi Shinbum article necessarily lead to the conclusion that all of Applicants' claims are enabled referred to on page 23 to page 25 of the Fifth Supplementary Amendment dated March 1, 2004.

## **REMARKS**

Reconsideration is respectfully requested in view of any changes to the claims and the remarks herein. Please contact the undersigned to conduct a telephone interview in accordance with MPEP 713.01 to resolve any remaining requirements and/or issues prior to sending another Office Action. Relevant portions of MPEP 713.01 are included on the signature page of this amendment.

Applicants gratefully acknowledge the allowance of claims 113, 114, 123-125, 135-138, 140, 151, 157, 167-169, 172-174, 177-179, 185, 186, 189-191, 196, 197, 213-216, 220, 221, 224-226, 231, 258-260, 264, 265, 269, 270, 276, 277, 280-282, 287, 288, 296-301, 304-307, 311, 312 and 315-317.

Applicants disagree with the rejection of the following claims for the reasons given herein. 1-72, 77-81, 84-112, 115-122, 126-134, 139, 141-150, 152-156, 158-166, 170, 171, 175, 176, 180-184, 187, 188, 192-195, 198-212, 217-219, 222, 223, 227-230, 232-257, 261-263, 266-268, 271-275, 278, 279, 283-286, 289-295, 303, 308-310, 313, 314, 318-376 and 379-413.

Applicants acknowledge that the Examiner entered Applicants' amendment and the six supplementary amendments, collectively referred to herein as Applicants' prior responses. Applicants acknowledge that the attachment(s) filed with the Sixth Supplemental Amendment have been entered and that claims 1-413 are currently pending. Applicants note that the Examiner has not commented on all of Applicants' arguments in the Applicants' amendment and six supplementary amendments. Therefore, Applicants request that the Examiner either allow all the pending claims or issue a non final action responding to all of Applicants' arguments. Applicants are entitled to the Examiner's comments to all of Applicants' arguments before a final rejection.

Claims 73-76, 82-83 and 377-378 are withdrawn from consideration as being drawn to a non-elected invention (process). Applicants disagree. Applicants have put claims 73-76, 82-83 and 377-378 in apparatus form.

The Examiner states at page 3:

Accordingly, the issue of the instant claims being supported by the priority document is believed moot in view of the withdrawal of the prior art rejections.

Applicants disagree that the "issue of the instant claims being supported by the priority document is ... moot in view of the withdrawal of the prior art rejections." Whether the claims are supported by the priority document is not dependent of whether there are prior art rejections. For the reasons given in Applicants' prior responses it is Applicants' view that all their claims are supported by the priority document and request that priority be granted to the priority document. Applicants disagree that the issue of the instant claims being supported by the priority document is moot.

The Examiner further states at page 3:

Claims 322-360 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Specifically, the examiner fails to find support for the claim terminology "...can be made in bulk according to a principle comprising a general principle of ceramic science". The specification makes no specific mention of "bulk", nor is there any description of

"general principle". The examiner suggests changing the terminology to "...wherein said compositions can be made according to known principles of ceramic fabrication". See specification, pages 8 and 15.

Applicants disagree that the claim terminology "... can be made in bulk according to a principle comprising a general principle of ceramic science" is not supported by the specification. Added claim language does not have to have literal or in haec verba support in the specification. All that is necessary is that a person of ordinary skill in the art would recognize from the specification that the inventor was in possession of that which is claimed. The Examiner has provided no justification for why a person of ordinary skill in the art would not recognize that the Applicants were not in possession of "... can be made in bulk according to a principle comprising a general principle of ceramic science." The term "in bulk" is recognized by a person of ordinary skill in the art to correspond to a macroscopic sample and "general principle" corresponds to what is generally known to a person of ordinary skill in the art at the time the application was filed. To satisfy the written description requirement the claim language does not have to be mentioned in the specification.

Claims 322-360 have been amended to change the terminology "can be made in bulk according to a principle comprising a general principle of ceramic science" to the language suggested by the Examiner "wherein said compositions can be made according to known principles of ceramic fabrication." The language suggested by the Examiner includes within its meaning both in bulk and general principles of ceramic science."

The Examiner further states at page 3:

Claims 211, 256, 302 and 394 are objected to because of the following Informalities: in part (a), applicant should clarify the claim language to clearly require both a (Group IIA element or rare earth element) and a

Group IIIB element must be present (if such is the case). Appropriate correction is required.

Claims 211, 256, 302 and 394 are correct in their present form since a High T<sub>c</sub> superconductor does not require both a Group IIA element or a rare earth element and a Group IIIB element.

The Examiner further states at page 4:

Claims 1-5, 7-11, 17, 19, 23, 28, 52-54, 59, 65, 72, 77-81, 86, 87, 94, 96-108, 144, 145, 149, 150, 152-156, 158-161, 165, 196, 170, 171, 175, 176, 180, 181, 235, 236, 240, 241-252, 257, 261, 262, 266, 267, 271, 272 and 361-413 are rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Applicants respectfully disagree for the reasons given herein below.

The Examiner further states at page 4:

The terms "layer-type", "perovskite-like", "rare-earth-like" and "near-rare earth" (claim 65) are vague and confusing. See MPEP 2173.05. The question arises: What is meant by these terms? The terms "layer-type" and "perovskite-like" are unclear because the "type" or "like" terms are deemed to be indefinite. Terms such as "like", "similar", and "type" are indefinite. Additionally, the newly added claims terminology "comprising a rare-earth characteristic", "comprising a layer characteristic" and "comprising a perovskite characteristic" are considered indefinite. The terms are considered identical in scope to the previously rejected terminology and are indefinite for the same reasons.

Applicants respectfully disagree. Applicants have shown that the USPTO routinely issues patents with claims having elements containing the language as "like", "similar" and "type". Thus it is accepted USPTO practice to not find such claims indefinite. Applicants have listed the issued claims of many of these patents in prior responses. There are many issued patents with claims having the identical terminology in the identical art such as for example "layer-type", "perovskite-like", "rare-earth-like" and "near-rare earth". There is no per se indefiniteness in these claim terms as recognized by the USPTO in issuing so many patents with claims containing this and related terminology.

The Examiner further states at page 4 in the footnote:

See Ex parte Remark, 15 USPQ 2d 1498, 1500 (BPAI 1990); Ex parte Kristensen, 10 USPQ 2d 1701, 1703 (BPAI 1989); Ex parte Attig, 7 USPQ 2d 1092, 1093 (BPAI 1988); and Ex parte Copenhaver, 109 USPQ 118 (POBA 1955).

Applicants have addressed the holding of these decisions in prior responses and have given extensive reasons why they do not apply in the present application. The Examiner has provided no rebuttal of these comments. As stated by Applicants and as proven by Applicants by reference to literature from the field of high  $T_c$  superconductivity. This terminology is the accepted terminology of the high  $T_c$  art. Thus persons of skill in the art recognize and understand the terminology "rare-earth-like", "perovskite-like", "perovskite-type" and "layer-type". There is no other better terminology.

The lack of antecedent basis for the terminology "said copper oxide" in claim 263, line 6, has been corrected.

The Examiner further states at page 5:

The Applicants argue that the terms "rare-earth like", "perovskite-like", and "perovskite-type" are definite. Those arguments are not found to be persuasive.

Each patent application is considered on its own merits. In some contexts it may have been clear in the art to use the term "like", such as when the "like" term is sufficiently defined. In the present case, however, the terms "rare-earth like" and "perovskite-like" are unclear. As suggested above, "rare-earth like" should be changed to --rare earth or Group IIIB element--. The terms "like" or "type" also should be removed from "perovskite-like" or "perovskite-type".

The Examiner states "Each patent is considered on its own merits. ... In the present case; however, the term "rare-earth-like" and "perovskite-like" are unclear." However, the Examiner has not stated why these terms are in the Examiner's view "unclear", but the identical terms in the cited issued patents are not unclear. The Examiner provides no standard against which to make such a determination. Therefore, the Examiner's reasons for rejection are arbitrary and capricious in violation of the Administrative Procedures Act. The Court of Appeals states in Orthokinetics Inc. v. Safety Travel Chars Inc. USPQ 2d 1081, 1088 in relation to a claim term asserted to be indefinite:

The phrase "so dimensioned" is as accurate as the subject matter permits, automobiles being of various sizes ... As long as those of ordinary skill in the art realized that dimensions could be easily obtained, §112, 2d ¶ requires nothing more. The patent law does not require that all possible lengths corresponding to the space in hundreds of different automobiles be listed in the patent, let alone that they be listed in the claim.



In the present invention Applicants have shown that the terms "perovskite-like", "rare-earth-like", "perovskite-type"; "layer-like" and "layer-type" are understood by persons of ordinary skill in the art. Nothing more is required by § 112, 2d paragraph. As stated by Applicants, the term "perovskite-type" and "perovskite-like" are used since the crystal structures referred to are not perovskite. As shown in prior responses the crystal structures are close to but not identical to perovskite.

The Examiner further states at page 5:

Claims 1-64, 66-72, 84, 85, 88-96, 100-102, 109-112, 115-122, 126-134, 139, 141-143, 146-149, 153-155, 162-166, 182-184, 187, 188, 192-195, 198-212, 217-219, 222, 223, 227-230, 232-234, 237-240, 244-246, 253-257, 268, 273-275, 278, 279, 283-286, 289-295, 302, 303, 308-310, 313, 314, 318-329, 331-334, 337-345, 347-357, 359-374, 376, 379, 380, 382, 383, 389, 394, 395, 402, 407 and 408 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for compositions comprising a transition metal oxide containing at least a) an alkaline earth element or Group IIA element and b) a rare-earth element or Group IIIB element, does not reasonably provide enablement for the invention as claimed. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make the invention commensurate in scope with these claims.

Applicants respectfully disagree. The claims are directed to an apparatus or structure. The claims are not directed to a composition of matter. The Examiner provides no reasons for why the specification does not enable an apparatus or structure comprising an element having at  $T_c \geq 26^\circ\text{K}$  and conducting a superconductive current at a temperature  $\geq 26^\circ\text{K}$  wherein the superconducting element does not comprise a transition metal oxide containing at least a) an alkaline earth element or Group IIA element and b) a rare earth element or Group IIIB element.

The Examiner further states at page 6:

The present specification is deemed to be enabled only for compositions comprising a transition metal oxide containing at least a) an alkaline earth element and b) a rare-earth element or Group IIIB element. The art of high temperature (above 300K) superconductors is an extremely unpredictable one. Small changes in composition can result in dramatic changes in or loss of superconducting properties. The amount and type of examples necessary to support broad claims increases as the predictability of the art decreases.<sup>2</sup> Claims broad enough to cover a large number of compositions that do not exhibit the desired properties fail to satisfy the requirements of 35 U.S.C. 112.<sup>3</sup> Merely reciting a desired result does not overcome this failure.<sup>4</sup> In particular, the question arises: will any layered perovskite material exhibit superconductivity?

The Examiner has repeated grounds for rejection that Applicants have rebutted. The Examiner has not stated why Applicants' rebuttal does not overcome these grounds for rejection.

A large number of examples are needed to support a broad claim in an unpredictable art only if a person of skill in the art has to engage in undue experimentation to determine embodiments not specifically recited in Applicants' teachings. It is the examiner's burden to show that undue experimentation is necessary. The examiner has presented no extrinsic evidence that a person of skill in the art would have to engage in undue experimentation which is the Examiner's burden. The examiner has stated without support that the art of high temperature superconductivity is an extremely unpredictable one. Applicants request that the Examiner support this statement with factual evidence or to withdraw the statement or to provide an Examiner's affidavit showing that the Examiner has the expertise to make such a statement not supported by documented factual evidence. Applicants have not merely stated a desired result as clearly shown by the five affidavits submitted by five

experts (Mitzi, Tsuei, Dinger, Duncombe and Shaw - Attachments 16, 18, 17, 20 and 19 of the Fifth Supplemental Amendment dated March 1, 2004, respectively) in the field, the Poole book (Attachment 21 of The Fifth Supplemental Amendment dated March 1, 2004) and the Rao article (Attachment C of the response submitted August 4, 2000) and the list of known high  $T_c$  superconductors Attachment 48 and 49, of the Fifth Supplemental Amendment dated March 1, 2004). And it is not necessary for any layered perovskite to work to satisfy 35 USC 112, first paragraph. It is only necessary that they can be determined without undue experimentation.

The Examiner restates without support that "It should be noted that at the time the invention was made, the theoretical mechanism of superconductivity in these materials was not well understood. That mechanism still is not understood." Applicants note that the theory of superconductivity has been understood for some time. For example, the book by Von Laue entitled "Superconductivity", published in English in 1952, presents a comprehensive theory of superconductivity. The entire text of this book is included in Attachment A of the response submitted August 4, 2000. Notwithstanding, for a claim to be enabled under section 112, it does not require an understanding of the theory. The examiner then conclusorily states "Accordingly, there appears to be little factual or theoretical basis for extending the scope of the claims much beyond the proportions and materials actually demonstrated to exhibit high temperature superconductivity". This statement is clearly inconsistent with *In re Angstadt* 190 USPQ 219 and *In re Wands* 8 USPQ2d 1400 which held that to satisfy the first paragraph of 35 USC 112 it is only necessary that a person of skill in the art not exercise undue experimentation to make samples that come within the scope of the Applicants' claims. Applicants have clearly shown that only routine experimentation is needed to fabricate samples to practice Applicants' claimed invention. The examiner has not denied, nor rebutted this. The examiner again incorrectly cites *Brenner v. Manson*, 383 US 519, 148 USPQ 689. stating a "patent is not a hunting license. It is not a reward for the search, but a reward for its successful conclusion". As stated in the Applicants' prior response, this quote applies to utility (a requirement under 35 USC 101) not to enablement (a requirement under 35 USC 112) and is thus incorrectly cited by the examiner.

The Examiner provides no factual evidence to support the statement “[t]he art of high temperature (above 30 K) superconductors is an extremely unpredictable one.” This is an opinion of the Examiner. As shown herein the basic theory of Superconductivity has been known since 1911 as indicated in the book by von Laue “Theory of Superconductivity” [Attachment 42 of the Fifth Supplemental Amendment submitted March 1, 2004]. The Examiner should withdraw the rejection, provide factual evidence to support the opinion or submit an examiner’s affidavit under MPEP 706.02(a) qualifying himself as an expert in the art of high  $T_c$  superconductors to offer such a conclusory opinion. It is Applicants’ teaching that controlling the amount of the constituents of the composition, such as oxygen content, effect the superconductive properties of the composition. It is a matter of routine experimentation to find the optimum constituents, such as oxygen content, for a particular high  $T_c$  superconducting composition. Applicants do not have to provide experimental results for every composition that fall within the scope of their claims when a person of skill in the art exercising routine experimentation has a reasonable expectation of success following Applicants’ teaching to achieve a composition through which can be flowed a superconducting current according to the teaching of Applicants’ specification.

According to In re Angstadt 190 USPQ 214, 218 in an unpredictable art, §112 does not require disclosure of a test with every species covered by a claim. The CCPA states:

To require such a complete disclosure would apparently necessitate a patent application or applications with “thousands” of examples or the disclosure of “thousands” of catalysts along with information as to whether each exhibits catalytic behavior resulting in the production of hydroperoxides. More importantly, such a requirement would force an inventor seeking adequate patent protection to carry out a prohibitive number of actual experiments. This would tend to discourage inventors from filing patent applications in an unpredictable area since the patent

claims would have to be limited to those embodiments which are expressly disclosed. A potential infringer could readily avoid "literal" infringement of such claims by merely finding another analogous catalyst complex which could be used in "forming hydroperoxides." (Emphasis Added)

The Examiner provides no evidence to support the examiner's statement that "[t]he amount and type of examples necessary to support broad claims increases as the predictability of the art decreases." The examiner has provided no evidence that the predictability of art of high  $T_c$  superconductivity is low. The Examiner's statement that "[c]laims broad enough to cover a large number of compositions that do not exhibit the desired properties fail to satisfy the requirements of 35 USC 112." implies that Applicants' claims "cover a large number of compositions that do not exhibit the desired properties" of high  $T_c$  superconductors. The Examiner has provided no evidence to support the examiners' implication. In fact, the claims do not cover any compositions that do not exhibit the desired properties of high  $T_c$  superconductors. Applicants' claims only cover apparatus or structures comprising superconductors having  $T_c \geq 26^\circ\text{K}$  which carry a superconductive current. Applicants' claims are not composition of matter claims. Under *In Re. Angstadt*, a patent application is not limited to claims covering embodiments expressly disclosed in their specification.

The Examiner's attention is directed to the following comments from the specification at page 1, lines 5-10:

"This invention relates to ... superconducting compositions including copper and/or transition metals."

The specification further states at page 5, lines 2-9 that:

It is another object of the present invention to provide novel superconductive materials that are multi-valent oxides including transition metals, the compositions having a perovskite-like structure.

It is a further object of the present invention to provide novel superconductive compositions that are oxides including rare earth and/or rare earth-like atoms, together with copper or other transition metals that can exhibit mixed valent behavior.

The specification further states at page 8, lines 1-11, that "[A]n example of a superconductive composition having high  $T_c$  is the composition represented by the formula RE-TM-O, where RE is a rare earth or rare earth-like element, TM is a nonmagnetic transition metal, and O is oxygen. Examples of transition metal elements include Cu, Ni, Cr etc. In particular, transition metals that can exhibit multi-valent states are very suitable. The rare earth elements are typically elements 58-71 of the periodic table, including Ce, Nd, etc. If an alkaline earth element (AE) were also present, the composition would be represented by the general formula RE-AE-TM-O."

And at page 7, lines 14-15, the specification states that "the rare earths site can also include alkaline earth elements."

The specification further states at page 11, lines 19-24, that "An example of a superconductive compound having a layer-type structure in accordance with the present invention is an oxide of the general composition  $RE_2TMO_4$ , where RE stands for the rare earths (lanthanides) or rare earth-like elements and TM stands for a transition metal."

The composition  $RE_2TMO_4:RE$  is referred to at page 24, lines 5-9;  $RE_{2-x}TM_xO_{4-y}$  is referred to at page 25, lines 19-21.

The following specific compounds are recited in the application:

$\text{Ba}_4\text{La}_{5-x}\text{Cu}_5\text{O}_{5(3-y)}$  at page 10, lines 4, 10, 14.  
 $\text{La}_{2-x}\text{Ba}_x\text{CuO}_{4-y}$  at page 12, line 13  
 $\text{La}_{2-x}\text{Ba}_x\text{NiO}_{4-y}$  at page 12, line 13  
 $\text{La}_{2-x}\text{Sn}_x\text{NiO}_{4-y}$  at page 12, line 17  
 $\text{Ce}_{2-x}\text{Cu}_x\text{NiO}_{4-y}$  at page 12, line 19  
 $\text{La}_2\text{CuO}_4$  at page 12, line 21  
 $\text{La}_2\text{CuO}_{4-y}$  with  $\text{Sr}^{2x}$ ,  $\text{Ba}^{2x}$  and  $\text{Ca}^{2x}$  substitution at page 13, line 17  
 $\text{La}_{2-x}\text{Sn}_x\text{CuO}_{4-y}$  at page 17, line 21  
 $\text{La}_{2-x}\text{Ca}_x\text{CuO}_{4-y}$  at page 17, line 21  
 $\text{La}_{2-x}\text{Ba}_x\text{CuO}_{4-y}$  at page 18, line 6  
 $\text{La}_2\text{CuO}_4 : \text{Ba}$  at page 18, line 15  
 $\text{La}_2\text{CuO}_4 : \text{Ba}$  at page 24, line 6  
 $\text{Nd}_2\text{NiO}_4 : \text{Sn}$  at page 24, line 9  
 $\text{La}_2\text{CuO}_{4-y}$  doped with  $\text{Sn}^{2x}$ ,  $\text{Ca}^{2x}$  and  $\text{Ba}^{2x}$  at page 25, lines 6-18

Other compounds are given in the articles to B. Raveau, in Mat. Res. Bull., Vol. 20 (1985) pp. 667-671 [Attachment 15A of the Fifth Supplemental Amendment dated March 1, 2004], and to C. Michel et al. in Rev. Claim. Min. 21 (1984) 407 [Attachment 15B of the Fifth Supplemental Amendment dated March 1, 2004], both of which are incorporated by reference at page 13, lines 4-5 of the specification.

The Examiner cites In re Fisher, 166 USPQ 18, In re Angstadt and Griffen, 150 USPO 214, and In re Colianni, 195 USPQ 150, in support of the statement “[t]he amount and type of examples necessary to support broad claims increases as the predictability of the art decreases”.

The claims under appeal In re Fisher are directed to increasing the potency of substances containing ACTH hormones for injection into human beings. In regards to the rejection for insufficient disclosure under 35 USC 112 the CCPA states that:

"the issue thus presented is whether an inventor with the first to achieve potency of greater than 1.0 for certain types of compositions, which potency was long designed because of its beneficial effects on humans, should be allowed to dominate *all* compositions having potencies greater than 1.0, thus including future compositions having potencies in excess of those obtainable from his teachings plus ordinary skill." 166 USPQ 18, 23-24 (emphasis in the original).

The Examiner has not shown that Applicants' claims include compositions "in excess of those obtainable from his teaching plus ordinary skill."

The CCPA goes on to say in *In re Fisher* that:

"It is apparent that such an inventor should be allowed to dominate the future patentable inventions of others where those inventions were based in some way on his teachings. Such improvements, while unobvious from his teachings, are still within his contribution, since the improvement was made possible by his work. It is equally apparent, however, that he must not be committed to achieve this dominance by claims which are insufficiently supported and hence, not in compliance with the first paragraph of 35 USC 112. That paragraph requires that the scope of the claims must bear a reasonable correlation to the scope of enablement provided by the specification to persons of ordinary skills in the art... In cases involving unpredictable factors, such as most chemical reactions... the scope of enablement obviously varies inversely with the degree of unpredictability of the factors involved." (166 USPQ 18, 24) (Emphasis added)

Applicants of the present invention have provided the first teaching that compositions, for example such as transition metal oxides, can form a superconductor having a critical temperature greater than or equal to 26°K, therefore, "is apparent that



such an [applicant] should be allowed to dominate the future patentable inventions of others when those inventions [are] based in some way on [Applicants] teaching" as stated by the CCPA in *In re Fisher supra*. All known high  $T_c$  superconductors are based on Applicants' teachings. The Examiner has acknowledged this by rejection of all claims over the Asahi Shinbum article under 35 USC 103 as described in detail below.

In the present invention, Applicants are acknowledged to be the pioneers of high  $T_c$  superconducting compositions, such as for example metal oxides. The Examiner has produced no evidence that inventions which come within the scope of Applicants' claim cannot be achieved by persons of skill in the art based on Applicants' teaching. The affidavits of Mitzi [Attachment 16 of the Fifth Supplemental Amendment dated March 1, 2004], Dinger [Attachment 17 of the Fifth Supplemental Amendment dated March 1, 2004], Tsuei [Attachment 18 of the Fifth Supplemental Amendment dated March 1, 2004], Shaw [Attachment 19 of the Fifth Supplemental Amendment dated March 1, 2004], Duncombe [Attachment 20 of the Fifth Supplemental Amendment dated March 1, 2004] and the book of Poole et al. state [Attachment 21 of the Fifth Supplemental Amendment dated March 1, 2004] it is straight forward to use the general principles of ceramic science to make high  $T_c$  superconductors following Applicants' teaching.

The claimed invention in *re Angstadt and Griffen* (190 USPQ 214) involves a methods of catalyically oxidizing alkylaromatic hydrocarbons to form a reaction comprising the corresponding hydroperoxides. The method employs catalysts. The Examiner rejected all the claims under 35 USC 112, first and second paragraphs. The Board's rational for affirming the Examiner's rejection was directed primarily to the enablement required of the first paragraph.

The CCPA reversing stated that:

"what is a maximum concern in the analysis of whether a particular claim is supported by the disclosure in an application, is whether the disclosure contains sufficient teaching regarding the subject matter of the claims as enabled one of skill in the art to make and to use the claimed invention. These two requirements 'how to make' and 'how to use' have some times been referred to in combination as the 'enablement requirement'... The relevancy may be summed up as being whether the scope of enablement provided to one of ordinary skill in the art by the disclosure as such as to be commensurate with the scope or protection sought by the claims. (190 USPQ 214,47 citing In re Moore 169 USPQ).

In the attached affidavits under 37 CFR 132, Dr. T. Dinger [Attachment 17 of the Fifth Supplemental Amendment dated March 1, 2004], Dr. Tsuei [Attachment 18 of the Fifth Supplemental Amendment dated March 1, 2004], Dr. Shaw [Attachment 19 of the Fifth Supplemental Amendment dated March 1, 2004], Mr. Duncombe [Attachment 20 of the Fifth Supplemental Amendment dated March 1, 2004] and Dr. D. Mitzi [Attachment 16 of the Fifth Supplemental Amendment dated March 1, 2004] state:

"That once a person of skill in the art knows of a specific transition metal oxide composition which is superconducting above 26°K, such a person of skill in the art, using the techniques described in the above-identified patent application, which includes all known principles of ceramic fabrication, can make the transition metal oxide compositions encompassed by claims 24-26, 86-90 and 96-108, without undue experimentation or without requiring ingenuity beyond that expected of a person of skill in the art. This is why the work of Bednorz and Müller was reproduced so quickly after their discovery and why so much additional work was done in this field within a short period of their discovery."

In the paragraph at the bottom of page 15 of the specification, it is stated that: in regard to compositions according to the present invention that "their manufacture

generally follows the known principles of ceramic fabrication." Thereafter, an example of a typical manufacturing process is given.

The CCPA in *In re Angstadt and Griffen* further states that:

"we cannot agree with the Board that Appellants' disclosure is not sufficient to enable one of ordinary skill in the art to practice the invention without undue experimentation. We note that many chemical processes and catalytic processes particularly, are unpredictable, ... , and the scope of enablement varies inversely with the degree of unpredictability involved... The question, then, whether in an unpredictable art, section 112 requires the disclosure of a test with every species covered by a claim. To require such a complete disclosure will apparently necessitate a patent application or applications with 'thousands ' of examples... . More importantly, such a requirement would force an inventor to seek adequate patent protection to carry out a prohibited number of natural experiments. This would tend to discourage inventors in filing patent applications in an unpredictable area since the patent claim would have to be limited those embodiments which are expressly disclosed. A potential infringer could readily avoid 'infringement of such claims' by merely finding another analogous (example) which could be used..." 190 USPQ 124, 218.

The CCPA in *In re Angstadt* further goes on to say

"having decided that appellants are *not* required to disclose every *species* encompassed by the claims even in an unpredictable art such as the present record presents, each case must be determined on its own facts." 190 USPQ 214, 218. (emphasis in the original).

In regards to the catalyst *In re Angstadt and Griffen* CCPA further states:

"since appellants have supplied the list of catalysts and have taught how to make or how to use them, we believe that the experimentation required to determine which catalyst will produce hydroperoxide would not be undue and certainly would not 'require ingenuity beyond that to be expected of one of ordinary skill in the art'. 190 USPQ, 214, 218 in re Field v. Conover 170 USPQ, 276, 279 (1971).

As stated in the affidavits of Dr. Dinger [Attachment 17 of the Fifth Supplemental Amendment dated March 1, 2004], Dr. Tsuei [Attachment 18 of the Fifth Supplemental Amendment dated March 1, 2004], Dr. Shaw [Attachment 19 of the Fifth Supplemental Amendment dated March 1, 2004], Mr. Duncombe [Attachment 20 of the Fifth Supplemental Amendment dated March 1, 2004] and Dr. Mitzi [Attachment 16 of the Fifth Supplemental Amendment dated March 1, 2004], to make the high temperature superconductors encompassed by Applicants' claims, using the teaching of the present invention would not require ingenuity beyond that expected of one of ordinary skill in the art.

The CCPA in In re Angstadt further states that:

"the basic policy of the Patent Act, which is to encourage disclosure of inventions and thereby to promote progress in the useful arts. To require disclosures in patent applications to transcend the level of knowledge of those skilled in the art would stifle the disclosure of inventions in fields man understands imperfectly." 190 USPQ 214, 219.

The CCPA further states that:

"the certainty which the law requires in patents is not greater than is reasonable." 242 USPQ, 270-271, cited in In re Angstadt. 190 USPQ 214, 219.

In re Angstadt further states at 190 USPQ 219:

We note that the PTO has the burden of giving reasons, supported by the record as a whole, why the specification is not enabling. In re Armbruster, 512 F.2d 676, 185 USPQ 152 (CCPA 1975). Showing that the disclosure entails undue experimentation is part of the PTO's initial burden under Armbruster; this court has never held that evidence of the necessity for *any* experimentation, however slight, is sufficient to require the applicant to prove that the type and amount of experimentation needed is not undue.

By calling the claimed "invention" the "scope of protection sought" the dissent obscures the problem and frustrates the intended operation of the patent system. Depriving inventors of claims which adequately protect them and limiting them to claims which practically invite appropriation of the invention while avoiding infringement inevitably has the effect of suppressing disclosure. What the dissent seem to be obsessed with is the thought of catalysts which won't work to produce the intended result. Applicants have enabled those in the art to see that this is a real possibility, which is commendable frankness in a disclosure. Without undue experimentation or effort or expense the combinations which do not work will readily be discovered and, of course, nobody will use them and the claims do not cover them. The dissent wants appellants to make everything predictable in advance, which is impracticable and unreasonable.

We hold that the evidence as a whole, including the inoperative as well as the operative examples, negates the PTO position that persons of ordinary skill in this art, given its unpredictability, must engage in undue experimentation to determine which complexes work. The key word is "undue," not "experimentation."

The passage quoted from the CCPA decision in *In re Angstadt* above provide the following eight factors:

1. The PTO has the burden of giving reasons why the specification is not enabling.
2. Showing that a disclosure requires undue experimentation is the PTO's initial burden.
3. That experimentation is needed to practice the claimed invention does not require the applicant to prove the experimentation needed is undue
4. Depriving inventors of claims that adequately protect them invites others to practice their invention while avoiding infringement will suppress disclosure.
5. When an applicant discloses compositions that are within the scope of the claims that will not work to practice the invention, this does not result in the claim being not enabled but is commendable honesty on the part of the inventor.
6. Examples that come within the scope of the claim that can be determined not to work without undue experimentation do not result in the claims not being enabled.
7. Everything does not have to be made predictable in advance.
8. To require everything to be made predictable in advance is impracticable and unreasonable.

These factors will be referred to herein as *In re Angstadt* Factors 1 to 8.

The only facts which the Examiner offers as evidence of unpredictability are examples provided in Applicants' specification. The CCPA in *In re Angstadt* says that this is "commendable frankness" which is not to be held against Applicants. The Examiner has provided no evidence that a person of skill in the art has to engage in

undue experimentation to practice Applicants' non-allowed claims. The affidavits of Mitzi [Attachment 16 of the Fifth Supplemental Amendment dated March 1, 2004], Dinger [Attachment 17 of the Fifth Supplemental Amendment dated March 1, 2004], Tsuei [Attachment 18 of the Fifth Supplemental Amendment dated March 1, 2004], Shaw [Attachment 19 of the Fifth Supplemental Amendment dated March 1, 2004] and Duncombe [Attachment 20 of the Fifth Supplemental Amendment dated March 1, 2004] and the book of Poole et al. [Attachment 21 of the Fifth Supplemental Amendment dated March 1, 2004] explicitly indicate that persons of skill in the art do not have to engage in undue experimentation to practice Applicants' invention.

The Examiner cited In re Colianni 195 USPQ 150 which Applicants believe is not on point since in In re Colianni "[t]here is not a single specific example or embodiment by way of an illustration of how the claimed method is to be practiced." (195 USPQ 150, 152). In contradistinction as noted above, there are numerous examples cited in Applicants' specification and incorporated references. Thus this decision is not on point.

"Showing that the disclosure entails undue experimentation is part of the PTO's initial burden." In re Armbruster 185 USPQ 152, 504. The Examiner has not shown that undue experimentation is required to practice Applicants' claims to their full scope.

"The practical approach followed consistently by [the CCPA] ..., places the initial burden on the PTO to show that the enabling disclosure is not commensurate in scope with the claim. Upon such a showing, the burden of rebuttal shifts to Applicants". In re Coliani 195 USPQ 150. Notwithstanding that the Examiner has not satisfied this initial burden, Applicants have provided evidence to show that their claims are fully enabled even though the burden for such a showing has not shifted to them.

"However, [the CCPA] has made it clear that the Patent and Trademark Office must substantiate its rejections for lack of enablement with reasons" In re Armbruster 185 USPQ 152, 153. The Examiner has merely asserted without support that "the art

of high temperature superconductivity is unpredictable..." and noted that Applicants identify examples of compounds that do not have  $T_c \geq 26^\circ\text{K}$ . But example that do not work that come within the scope of a does not result in the claim not being enabled.

The CCPA in *In re Marzocchi*, 58 CCPA 1069, 439 F. 2d 220, 169 USPQ 367, 369-370 (1971) states:

"The only relevant concern of the Patent Office under these circumstances should be over the *truth* of any such assertion. The first paragraph of §112 requires nothing more than objective enablement. How such a teaching is set forth, either by the use of illustrative examples or by broad terminology, is of no importance.

As a matter of Patent Office practice, then, a specification disclosure which contains a teaching of the manner and process of making and using the invention in terms which correspond in scope to those used in describing and defining the subject matter sought to be patented *must* be taken as in compliance with the enabling requirement of the first paragraph of §112 *unless* there is reason to doubt the objective truth of the statements contained therein which must be relied on for enabling support. Assuming that sufficient reason for such doubt does exist, a rejection for failure to teach how to make and/or use will be proper on that basis; such a rejection can be overcome by suitable proofs indicating that the teaching contained in the specification is truly enabling...

[I]t is incumbent upon the Patent Office, whenever a rejection on this basis is made, to explain *why* it doubts the truth or accuracy of any statement in a supporting disclosure and to back up assertions of its own with acceptable evidence or reasoning which is inconsistent with the contested statement. Otherwise, there would be no need for the applicant



to go to the trouble and expense of supporting his presumptively accurate disclosure. [Emphasis in original footnote deleted].

Applicants have submitted affidavits of Dr. Mitzi [Attachment 16 of the Fifth Supplemental Amendment dated March 1, 2004], Dr. Tsuei [Attachment 18 of the Fifth Supplemental Amendment dated March 1, 2004], Dr. Shaw [Attachment 19 of the Fifth Supplemental Amendment dated March 1, 2004], Mr. Duncombe [Attachment 20 of the Fifth Supplemental Amendment dated March 1, 2004] and Dr. Dinger [Attachment 17 of the Fifth Supplemental Amendment dated March 1, 2004] under 37 CFR 132 which state, as quoted above, that once a person of skill in the art knows of Applicants' work, the compositions encompassed by the claims under experimentation, can be made using the teaching of Applicants without undue experimentation thereby rebutting the Examiner's statement that:

"[the specification ... [fails] to provide an enabling disclosure commensurate with the scope of the claims."

The Examiner cites *In re Cook* 169 USPQ 298, 302 and *Cosden Oil v. American Hoechst* 214 USPQ 244, 262 to support the statement "[c]laims broad enough to cover a large number of compositions that do not exhibit the desired properties fail to satisfy the requirement of 35 USC 112." The quoted language is from *Cosden Oil v. American Hoechst* which is directed to claims to compositions of matter. The present claims are not directed to compositions of matter. Applicants' claims do not read on any inoperative specifies since Applicants' claims are apparatus of use claims. A composition which does not have a  $T_c \geq 26^\circ\text{K}$  is not within the scope of the claims. Applicants note that *Cosden Oil v. American Hoechst* is a distinct court decision decided in 1982 and has not been cited to or followed by the CAFC in the more that 22 years since this decision. Thus these decisions are not on point. Moreover, such examples are not evidence of lack of enablement according to *In re Angstadt*. (Factors 5 and 6)

The Examiner cites *In re Corkill* 226 USPQ 1005, 1009 as support for this statement “[m]erely reciting a desired result does not overcome this failure”. In sustaining a rejection for indefiniteness the CAFC held “[c]laims which include a substantial measure of inoperatives ... are fairly rejected under 35 USC 112.” Thus *In re Corkill* holds claims indefinite when the “claims do not correspond in scope to what they regard as their invention.” The Examiner has cited *In re Corkill* for a rejection under 35 USC 112, first paragraph, to which it does not apply. Applicants’ claims include no inoperatives. Since Applicants’ claims are apparatus for use claims they are functional and thus exclude inoperatives. “[T]he use of functional language is sanctioned specifically by ... section 112.” *In re Angstadt* 190 USPQ 214, 217.

The Examiner cited *Brenner v. Manson* 148 USPQ 689 for the statement “a patent is not a hunting license. It is not a reward for the search, but a reward for its successful conclusion.” The claim in question was a method of making a composition. The composition had no known use. The method was found to lack utility and thus is not be patentable. This is not relevant to §112, first paragraph. Thus this decision is not on point. Moreover, Applicants have had a successful conclusion, they won a Nobel Prize and initiated and enabled the high  $T_c$  art.

The Examiner queries “[w]ill any layered perovskite material containing copper exhibit superconductivity?” and “does any stoichiometric combination of rare earth, an alkaline earth, and copper elements result in an oxide superconductor?” Since Applicants’ claims are directed to apparatus of using compositions, Applicants’ claims read on only those layered perovskite materials which exhibit superconductivity with a  $T_c \geq 26^\circ\text{K}$  and do not read on apparatus of use of compositions which are not superconductive. Thus the Examiner’s queries is not relevant to Applicants’ claims. Applicants are not claiming a composition which is a high  $T_c$  superconductor. Thus Applicants’ claims do not read on any layer perovskite, or any other stoichiometric combination, but only on those apparatus carrying a high  $T_c$  superconducting current. Apparatus of use claims are inherently narrower in scope than composition claims.

The paragraph bridging pages 13 and 14 refer to Ba-La-Cu-O systems having different crystallographic phases having  $\text{Cu}^{3+}$  and  $\text{Cu}^{2+}$  ions or  $\text{Ni}^{3+}$  and  $\text{Ni}_{2+}$  ions.

Claim 247 of the present invention recites "a copper oxide compound having a layer-type-perovskite-like crystal structure, the copper oxide compound including at least one rare-earth or rare-earth-like element, and at least one alkaline-earth element". In regard to the stated elements, the rare earth elements are defined in the specification at page 7, lines 9-12 to be "a group IIIB element, such as La." Group IIIB includes Sc, Y, La and Ac, rare earth-like or near rare earth. The rare earth elements are elements 58 to 71. This group contains four elements from group IIIB and fourteen elements from the rare-earth for a total of 18 elements. The alkaline earths contain the elements of Group A which has 6 elements.

The Examiner further states at page 7:

It should be noted that at the time the invention was made, the theoretical mechanism of superconductivity in these materials was not well understood. That mechanism still is not understood. Accordingly, there appears to be little factual or theoretical basis for extending the scope of the claims much beyond the proportions and materials actually demonstrated to exhibit high temperature superconductivity. A "patent is not a hunting license. It is not a reward for the search, but a reward for its successful conclusion".<sup>5</sup>

The Examiner has repeated grounds for rejection that Applicants have rebutted. The Examiner has not stated why Applicants' rebuttal does not overcome these grounds for rejection.

The Examiner has provided no evidence to support the statement "that at the time the invention was made, the theoretical mechanism of superconductivity in these materials was not well understood. That mechanism is still not understood."

Applicants' request the Examiner to introduce evidence to support this statement or to place an Examiner's affidavit under MPEP 706.02(a) qualifying the Examiner as an expert to make this statement. The Examiner further states "there appears to be little factual or theoretical basis for extending the scope of the claims much beyond the proportions and materials actually demonstrated to exhibit high temperature superconductivity." This is the Examiner's unsupported opinion. The five affidavits of Mitzi [Attachment 16 of the Fifth Supplemental Amendment dated March 1, 2004], Dinger [Attachment 17 of the Fifth Supplemental Amendment dated March 1, 2004], Tsuei [Attachment 18 of the Fifth Supplemental Amendment dated March 1, 2004], Shaw [Attachment 19 of the Fifth Supplemental Amendment dated March 1, 2004] and Duncombe [Attachment 20 of the Fifth Supplemental Amendment dated March 1, 2004] under 37 CFR 1.132 and the book to Poole et al. [Attachment 21 of the Fifth Supplemental Amendment dated March 1, 2004] described below provide factual evidence supporting Applicants' position that once a person of skill in the art knew from Applicant's article that compositions, such as transition metal oxides, were high  $T_c$  superconductors, it was a matter of routine application of the general principles of ceramic science to fabricate compositions, such as transition metal oxide superconductors, other than those actually made by Applicants. Quoting "Brenner v. Manson", 283 US 518, 148 USPQ 689, the Examiner further states that a "patent is not a hunting license. It is not a reward for the search, but a reward for its successful conclusion." The evidence introduced by Applicants clearly shows that Applicant's article upon which the present application is based had a very successful conclusion. Applicants started the field of high  $T_c$  superconductivity. All the further developments were based on Applicants' teaching. Moreover, the issue in Brenner v. Manson was the patentability of a method to fabricate a composition. The composition had no use. The method was found not patentable for lack of utility. To issue a patent for such a process would be granting a hunting license for a utility that may occur in the future. This case has nothing to do with §112 enablement.

The Examiner further states at page 7:

Upon careful consideration of the evidence as a whole, including the specification teachings and examples, and applicant's affidavits and remarks, the examiner has determined that the instant specification is enabled for compositions comprising a transition metal oxide containing an alkaline earth element and a rare-earth or Group IIIB element (as opposed to only compositions comprising  $Ba_{1-x}La_xCuO_y$  as stated in the Final Office action). Applicant has provided guidance throughout the instant specification that various transition metal oxides (such as copper oxide) containing an alkaline earth element and a rare-earth or Group IIIB element result in superconductive compounds which may in turn be utilized in the instantly claimed apparatus.

The Examiner has repeated grounds for rejection that Applicants have rebutted. The Examiner has not stated why Applicants' rebuttal does not overcome these grounds for rejection.

Applicants disagree that they have only enabled compositions containing an alkaline earth element and a rare earth or Group III B element to result in superconductive compounds which may in turn be utilized in the instantly claimed methods. There are numerous examples of high  $T_c$  superconductors made using the general principals of ceramic science as taught by Applicants. These principals that existed prior to Applicants' priority date.

The Examiner further states at page 8:

Applicant's remarks have been carefully considered. The following remarks are believed to address each of the issues raised by applicant. applicants' arguments, as well as the Affidavits filed 5/1/98, 5/14/98, 12/16/98 and 3/3/04 (1.132 Declarations of Mitzi, Tsuei, Dinger and Shaw) (Advisory mailed 2/25/99 (Paper 77E)) have been fully considered but they are not deemed to be persuasive.

The Examiner has provided no reason for why the 1.132 Declarations of Mitzi, Tsuei, Dinger and Shaw are not persuasive.

The Examiner further states at page 8:

The additional case law and arguments by the applicants have been duly noted. For the reasons that follow, however, the record as a whole is deemed to support the initial determination that the originally filed disclosure would not have enabled one skilled in the art to make and use the invention to the scope that it is presently claimed.

The Examiner has repeated grounds for rejection that Applicants have rebutted. The Examiner has not stated why Applicants' rebuttal does not overcome these grounds for rejection.

The Examiner again uses the word "deemed", that is, it is the Examiner's conclusory opinion unsupported by any factual evidence. The quoted passage is completely contrary to the Examiner's rejection under 35 USC 102(a) and 103(a). Under these rejections the Examiner found the Asahi Shinbum article [Attachment 6 of the Fifth Supplemental Amendment dated March 1, 2004] would have enabled one skilled in the art to make and use the invention to the scope that it is presently claimed. As noted above, the Asahi Shinbum article relies upon Applicants' article [Attachment 3 of the Fifth Supplemental Amendment dated March 1, 2004]. Applicants' view is further supported by the five affidavits of Mitzi [Attachment 16 of the Fifth Supplemental Amendment dated March 1, 2004], Tsuei [Attachment 18 of the Fifth Supplemental Amendment dated March 1, 2004], Dinger [Attachment 17 of the Fifth Supplemental Amendment dated March 1, 2004], Shaw [Attachment 19 of the Fifth Supplemental Amendment dated March 1, 2004] and Duncombe [Attachment 20 of the Fifth Supplemental Amendment dated March 1, 2004] under 37 CFR 1.132 and the book of Poole [Attachment 21 of the Fifth Supplemental Amendment dated March 1, 2004]

which will be described below and which states that once it was known from Applicants' article that transition metal oxides, were superconductive at temperatures above greater than or equal to 26°K, other high  $T_c$  materials, such as transition metal oxides, could be made by a person of skill in the art using the teaching of Applicants and the general teachings of ceramic science.

The Examiner further states on pages 8-9:

Applicants argue that their disclosure refers to "the composition represented by the formula RE-TM-O, where RE is a rare earth or rare earth-like element, TM is a nonmagnetic transition metal, and O is oxygen", and list several species such as "La<sub>2-x</sub>Ba<sub>x</sub>CUO<sub>4-y</sub>" which they indicate are found in the present disclosure.

Notwithstanding that argument, it still does not follow that the invention is fully enabled for the scope presently claimed. The claims include formulas which are much broader than the RE-TM-O formula cited in the disclosure. Claim 24 recites "a transition metal oxide", claim 88 "a composition", and claim 96 "a copper-oxide compound".

The Examiner has repeated grounds for rejection that Applicants have rebutted. The Examiner has not stated why Applicants' rebuttal does not overcome these grounds for rejection.

Applicants respectfully disagree. In the priority document, for example in the abstract, RE is a rare earth element, TM is a transition metal and O is oxygen. The priority document [Attachment 1 of the Fifth Supplemental Amendment dated March 1, 2004] further states at Col. 2, lines 22-25 "the lanthanum which belongs to the IIB group of elements is in part substituted by one member of the neighboring IIA group of elements...". Group IIA elements are the alkaline earth elements. The present specification teaches at page 11, lines 22-23, that RE stands for the rare earths

(lanthanides) or rare earth-like elements. The "rare earth like element" acts like a rare earth element in the superconductive composition. Thus a rare earth-like element is an equivalent of rare earth element. Similar language appears in the present specification at page 12 lines 6--8, "the lanthanum which belongs to the IIB group of elements is in part substituted by one member of the neighboring IIA group of elements...". Therefore, the priority document teaches a "composition including a transition metal, a rare earth or rare earth-like element, and alkaline earth. Applicants note that in the passage quoted above, the Examiner incorrectly states that Applicants' claim a composition. This is not correct. Applicants' claim an apparatus for flowing a superconducting current in a composition, such as a transition metal oxide. (This characterization is exemplary only and not intended to limit the scope of any claims.) In the last sentence of the passage quoted above the Examiner incorrectly states "the claimed composition is **deemed** to be much broader than [the] formula"  $RE_2TM.O_4$ ". The priority document is not limited to his formula. The composition taught by the priority document have variable amounts of oxygen, rare earth, rare earth-like and alkaline earth elements as is clearly shown in the abstract of the priority document.

The Examiner further states at page 9:

The present specification actually shows that known forms of "a transition metal oxide", "a composition" and "a copper-oxide compound" do not show the onset of superconductivity at above 26°K. At p. 3, line 20, through p. 4, line 9, of their disclosure, the applicants state that the prior art includes a "Li- Ti-O system with superconducting onsets as high as 13.7°K." Official Notice is taken of the well-known fact that Ti is a transition metal. That disclosure also refers to "a second, non-conducting CuO phase" at p. 14, line 18.

The Examiner has repeated grounds for rejection that Applicants have rebutted. The Examiner has not stated why Applicants' rebuttal does not overcome these grounds for rejection



Applicants' claims are directed to an apparatus comprising "compositions", "transition metal oxides", "a composition" and "a copper-oxide compound" having a  $T_c \geq 26^\circ\text{K}$  which is carrying a superconducting current. Applicants' claims do not include in the claimed apparatus compositions having  $T_c < 26^\circ\text{K}$ . Thus the examples on page 3, line 20 - page 4, line 9, are not included in Applicants' claims. That these are transition metal oxides having  $T_c < 26^\circ\text{K}$  does not mean that Applicants' claims directed to transition metal oxides, compositions and copper oxides having  $T_c \geq 26^\circ\text{K}$  are not enabled. Applicants provide the teaching on how to fabricate such compositions having  $T_c \geq 26^\circ\text{K}$ . The "second non-conducting CuO phase" referred to at page 14, line 18, again does not mean that Applicants' claims are not enabled. Applicants' statements at page 14 is part of Applicants' teaching on how to achieve an oxide having a  $T_c \geq 26^\circ\text{K}$ . The Examiner is attempting to use Applicants' complete description of their teaching to show lack of enablement when, in fact, this complete teaching provides full enablement by showing how samples are and are not to be prepared. Applicants have claimed their invention functionally, that is, as an apparatus of use so the Applicants' claim do not read on inoperable species. What the Examiner "seems to be obsessed with is the thought of [compositions] which won't work to produce the intended result. Applicants have enabled those of skill in the art to see that this is a real possibility which is commendable frankness in a disclosure." In re Angstadt, Supra. Thus, the CCPA has found that the existence of compositions that do not work does not mean that the claimed inventions are not enabled.

The Examiner further states at page 9:

Accordingly, the present disclosure is not deemed to have been fully enabling with respect to the "transition metal oxide" of claim 24, the "composition" of claim 88, or the "copper-oxide compound" of claim 96.

Again without facts the Examiner “deems” (that is, the Examiner conclusorily asserts) Applicants’ claims not enabled and for the reasons given above Applicants disagree. The only attempt at a factual support for the Examiner’s statement are the examples provided by Applicants which show  $T_c < 26^\circ\text{K}$ . Applicants provide this teaching so that a person of skill in the art will be fully informed on how to practice Applicants’ invention.

The Examiner further states at page 10:

The availability requirement of enablement must also be considered in light of the scope or breadth of the claim limitations. The Board of Appeals considered this issue in an application which claimed a fermentative method using microorganisms belonging to a species. Applicants had identified three novel individual strains of microorganisms that were related in such a way as to establish a new species of microorganism, a species being a broader classification than a strain. The three specific strains had been appropriately deposited. The issue focused on whether the specification enabled one skilled in the art to make any member of the species other than the three strains which had been deposited. The Board concluded that the verbal description of the species was inadequate to allow a skilled artisan to make any and all members of the claimed species. Ex parte Jackson 217 USPQ 804, 806 (Bd. App. 1982).

Ex parte Jackson is not applicable to the present application. The board in Ex parte Jackson states at 217 USPQ 804, 806-807:

The first paragraph of 35 U.S.C. 112 requires that the disclosure of an invention be “in such a full, clear, concise and exact terms as to enable any person skilled in the art to which it pertains or with which it is most nearly connected, to make and use the same ... Decisional law has interpreted the statutory requirement as dictating that sufficient

information be given in the application so that one of ordinary skill in the art can practice the invention without undue experimentation. ...

The determination of what constitutes undue experimentation in a give case requires the application of a standard or reasonableness, having due regard for the nature of the invention and the state of the art. ...

The test is not merely quantitative, since a considerable amount of experimentation is permissible if it is merely routine, or if the specification in question provides a reasonable amount of guidance with respect to the direction in which the experimentation should proceed to enable the determination of how to practice a desired embodiment of the invention claimed.

The Board states at 217 USPQ 806 "The issue squarely raised by [the] rejection [of claims] is whether or not a description of several newly discovered strains of bacteria having a particularly desirable metabolic property in terms of the conventionally measured culture characteristic and a number of metabolic and physiological properties would enable one of ordinary skill in the relevant art to independently discover additional strains having the same specific desirable metabolic property, i.e., the production of a particular antibiotic."

The Board in Ex parte Jackson further states at 217 USPQ 808 "The problem of enablement of processes carried out by microorganisms were uniquely different from the field of chemistry generally. Thus, we are convinced that such recent cases as In re Angstadt 537 F.2d 498, 190 USPQ 214 (CCPA 1976) and In re Geerdes 491 F.2d 1260, 180 USPQ 789 (CCPA 1974) are in apposite to this case." Therefore, since the present application is not directed to biotechnology or microorganism invention, the decision of Ex parte Jackson does not apply.

The Board in Ex parte Jackson further states at 217 USPQ 808 "The experimentation involved in the ordinary chemical case, including [In re Angstadt and In re Geerdes], usually arise in testing to establish whether a particular species within the generic claim language will be operable in the claimed process." As stated herein the method of "testing" to establish whether a particular species within the generic claim language will be "superconductive with a  $T_c \geq 26^\circ\text{K}$  is well known prior to Applicants' priority date. Also, the process for making the compositions is well known prior to the Applicants' priority date.

The Board in Ex parte Jackson cited In re Geerdes 180 USPQ 789. The Court in In re Geerdes at 180 USPQ 793 states in reversing a rejection of claims under 35 U.S.C. 112, first paragraph, for lack of enablement "the area of technology involved here in not particularly complex and there is no evidence in the record to indicate that one of skill in the art would not be able to make and use the claimed invention." The area of technology involved in the present application in regard to making high  $T_c$  materials is well known.

The Court in In re Geerdes further states at 180 USPQ 993 "The Board expressed concern that 'experimentation' is involved in the selection of proportions and particle sizes, but this is not determinative of the question of scope of enablement. It is only undue experimentation that is fatal."

The Court further states at 180 USPQ 793 "we cannot agree with the Board's determination that the claims are inclusive of materials which would not apparently be operative in the claimed process ... of course it is possible to argue that process claims encompass inoperative embodiments on the premise of unrealistic or vague assumptions, but that is not a valid basis for rejection." The Examiner's basis for rejection of Applicants' claims is impermissibly premised on unrealistic or vague assumptions, such as examples cited by Applicant having a  $T_c < 26^\circ\text{K}$  and unsupported statements such as the theory of Superconductivity is not understood.

Chapter 5 of the Poole et al. [Attachment 21 of the Fifth Supplemental Amendment] book entitled "Preparation and Characterization of Samples" states at page 59 "[c]opper oxide superconductors with a purity sufficient to exhibit zero resistivity or to demonstrate levitation (Early) are not difficult to synthesize. We believe that this is at least partially responsible for the explosive worldwide growth in these materials". Poole et al. further states at page 61 "[i]n this section three methods of preparation will be described, namely, the solid state, the coprecipitation, and the sol-gel techniques (Hatfi). The widely used solid-state technique permits off-the-shelf chemicals to be directly calcined into superconductors, and it requires little familiarity with the subtle physicochemical process involved in the transformation of a mixture of compounds into a superconductor." Poole et al. further states at pages 61-62 "[i]n the solid state reaction technique one starts with oxygen-rich compounds of the desired components such as oxides, nitrates or carbonates of Ba, Bi, La, Sr, Ti, Y or other elements. ... These compounds are mixed in the desired atomic ratios and ground to a fine powder to facilitate the calcination process. Then these room-temperature-stable salts are reacted by calcination for an extended period (~20hr) at elevated temperatures (~900°C). This process may be repeated several times, with pulverizing and mixing of the partially calcined material at each step." This is generally the same as the specific examples provided by Applicants and as generally described at pages 8, line 19, to page 9, line 5, of Applicants' specification which states "[t]he methods by which these superconductive compositions can be made can use known principals of ceramic fabrication, including the mixing of powders containing the rare earth or rare earth-like, alkaline earth, and transition metal elements, coprecipitation of these materials, and heating steps in oxygen or air. A particularly suitable superconducting material in accordance with this invention is one containing copper as the transition metal." (See Attachment A of Applicants' response dated May 14, 1998 [Attachment 23 of the Fifth Supplemental Amendment] and See Attachment H of Applicants' response dated November 28, 1997 [Attachment 24f the Fifth Supplemental Amendment]). Consequently, Applicants have fully enabled high  $T_c$  transition metal oxides and their claims.

It is therefore clear that undue experimentation is not required to practice Applicants' claimed invention.

The Examiner further states at page 10-11:

In *Enzo Biochem, Inc. v. Calgene, Inc.*, 188 F.3d 1362, 52 USPQ2d 1129 (Fed. Cir. 1999), the court held that claims in two patents directed to genetic antisense technology, (which aims to control gene expression in a particular organism), were invalid because the breadth of enablement was not commensurate in scope with the claims. Both specifications disclosed applying antisense technology in regulating three genes in *E. coli*. Despite the limited disclosures, the specifications asserted that the "[t]he practices of this invention are generally applicable with respect to any organism containing genetic material which is capable of being expressed." such as bacteria, yeast, and other cellular organisms." The claims of the patents encompassed application of antisense methodology in a broad range of organisms. Ultimately, the court relied on the fact that (1) the amount of direction presented and the number of working examples provided in the specification were very narrow compared to the wide breadth of the claims at issue, (2) antisense gene technology was highly unpredictable, and (3) the amount of experimentation required to adapt the practice of creating antisense DNA from *E. coli* to other types of cells was quite high, especially in light of the record, which included notable examples of the inventor's own failures to control the expression of other genes in *E. coli* and other types of cells.

The Examiner cites *Enzo v Calgene* 52 USPQ2d 1129 which is a biotechnology decision. This decision is not applicable to the present invention as stated by *Ex parte Jackson* as stated above. The Court in *Enzo v. Calgene* at 52 USPQ2d 1129, 1135 applies the facts of *In re Wands* 8 USPQ2d 1400.

The CAFC in Enzo at 52 USPQ2d 1129, 1138 cites In re Vaeck 20 USPQ2d 1438 stating:

It is well settled that patent Applicants are not required to disclose every species encompassed by their claims, even in an unpredictable art. However, there must be sufficient disclosure, either through illustrative examples or terminology, to teach those of ordinary skill how to make and use the invention as broadly as it is claimed.

Applicants have satisfied the standard of In re Vaeck.

The MPEP SECTION---2164.01(a) entitled "Undue Experimentation Factors" citing In re Wands 8 USPQ2d 1400 states:

There are many factors to be considered when determining whether there is sufficient evidence to support a determination that a disclosure does not satisfy the enablement requirement and whether any necessary experimentation is "undue." These factors include, but are not limited to:

- (A) The breadth of the claims;
- (B) The nature of the invention;
- (C) The state of the prior art;
- (D) The level of one of ordinary skill;
- (E) The level of predictability in the art;
- (F) The amount of direction provided by the inventor;
- (G) The existence of working examples; and
- (H) The quantity of experimentation needed to make or use the invention based on the content of the disclosure.

The Examiner has not applied these factors. Applicants have shown that:

(A) Their claims are as broad as their discovery which is that compounds, such as metal oxides, can carry a superconductive current for a  $T_c \geq 26^{\circ}$  K;

(B) The invention is easily practiced by a person of skill in the art;

(C) The state of the prior art clearly shows how to fabricate materials which can be used to practice Applicants' invention;

(D) The level of one of ordinary skill in the art is not high since as stated in the Poole et al. book [Attachment 21] materials to practice Applicants' invention are easily made and all that is needed to practice Applicants' claimed invention is to cool the material below the  $T_c$  and to provide a current which will be a superconductive current. It has been well known how to do this since the discovery of superconductivity in 1911. (See page 1 of "Superconductivity" by M. Von Laue) [Attachment 42]

(E) There is no unpredictability in how to make materials to practice Applicants' invention and there is no unpredictability in how to practice Applicants' invention. The only unpredictability is which particular composition will have a  $T_c \geq 26^{\circ}$  K. As extensively shown by Applicants this is a matter of routine experimentation. The Examiner has not denied nor rebutted this.;

(F) Applicants have provided extensive direction to make materials to practice their claimed invention. They have included all known principles of ceramic science. Also, as stated in the Poole book these materials are easily made. The Examiner has not denied nor rebutted this. The Examiner has made no comment on the amount of direction provided by the Applicants;



(G) Applicants have provided sufficient working examples and examples of compositions that have  $T_c \geq 26^\circ\text{K}$  for a person of skill in the art to fabricate materials that can be used to practice Applicants' claimed invention; and

(H) Applicants have shown that the quantity of experimentation needed to make samples to use the invention based on the content of the disclosure in the specification is routine experimentation.

The MPEP SECTION---2164.01(a) further states:

The fact that experimentation may be complex does not necessarily make it undue, if the art typically engages in such experimentation. In re Certain Limited-Charge Cell Culture Microcarriers, 221 USPQ 1165, 1174 (Int'l Trade Comm'n 1983), aff'd. sub nom., Massachusetts Institute of Technology v. A.B. Fortia, 774 F.2d 1104, 227 USPQ 428 (Fed. Cir. 1985).

See also In re Wands, 858 F.2d at 737, 8 USPQ2d at 1404. The test of enablement is not whether any experimentation is necessary, but whether, if experimentation is necessary, it is undue. In re Angstadt, 537 F.2d 498, 504, 190 USPQ 214, 219 (CCPA 1976). MPEP 2164

There is no statement by the Examiner nor any evidence in the record that the experimentation to make materials to practice Applicants' claimed invention is complex or undue. But it is clear that even if the experimentation was complex to make samples to practice Applicants' claimed invention it would not render Applicants' claims not enabled since the art typically engages in the type of experimentation taught by Applicants to make samples to practice their claimed invention.

The facts of *In re Wands* have similarity to the facts of the present application under examination. The Court at 8 USPQ2d 1406 held that:

The nature of monoclonal antibody technology is that it involves screening hybridomas to determine which ones secrete antibody with desired characteristics. Practitioners of this art are prepared to screen negative hybridomas in order to find one that makes the desired antibody.

Correspondingly Applicants have shown that the nature of high  $T_c$  technology is that it involves preparing samples to determine which ones have  $T_c \geq 26^\circ\text{K}$  - the desired characteristic. Practitioners of this art are prepared to prepare samples in order to find one that have the desired  $T_c$ . Nothing more is required under *In re Wands*.

Applicants have shown that their specification is enabling with respect to the claims at issue and that there is considerable direction and guidance in the specification; with respect to Applicants' claimed invention there was a high level of skill in the art to fabricate samples at the time the application was filed; and all of the methods needed to practice the invention were well known. Thus Applicants have shown that after considering all the factors related to the enablement issue, it would not require undue experimentation to obtain the materials needed to practice the claimed invention. The Examiner has not denied nor rebutted this.

A conclusion of lack of enablement means that, based on the evidence regarding each of the above factors, the specification, at the time the application was filed, would not have taught one skilled in the art how to make and/or use the full scope of the claimed invention without undue experimentation. *In re Wright*, 999 F.2d 1557, 1562, 27 USPQ2d 1510, 1513 (Fed. Cir. 1993). It is the Examiner's burden to show this and the Examiner has clearly not done so.

The breadth of the claims was a factor considered in *Amgen v. Chugai Pharmaceutical Co.*, 927 F.2d 1200, 18 USPQ2d 1016 (Fed. Cir.), cert. denied, 502

U.S. 856 (1991). In the Amgen case, the patent claims were directed to a purified DNA sequence encoding polypeptides which are analogs of erythropoietin (EPO). The Court stated that:

Amgen has not enabled preparation of DNA sequences sufficient to support its all-encompassing claims. . . . [D]espite extensive statements in the specification concerning all the analogs of the EPO gene that can be made, there is little enabling disclosure of particular analogs and how to make them. Details for preparing only a few EPO analog genes are disclosed. . . . This disclosure might well justify a generic claim encompassing these and similar analogs, but it represents inadequate support for Amgen's desire to claim all EPO gene analogs. There may be many other genetic sequences that code for EPO-type products. Amgen has told how to make and use only a few of them and is therefore not entitled to claim all of them. 927 F.2d at 1213-14, 18 USPQ2d at 1027.

In the present application Applicants have provided a teaching (and proof thereof) of how to make all known high  $T_c$  materials useful to practice their claimed invention. As the Amgen court states this type of disclosure justifies a generic claim. As the In re Angstadt court states the disclosure does not have to provide examples of all species within Applicants' claims where it is within the skill of the art to make them. There is no evidence to the contrary.

The Examiner states in the answer brief of the parent application "[t]he appellants argue that their own examples do not support the determination of non-enabling scope of the invention. Nevertheless, the record is viewed as a whole. If the Applicants could not show superconductivity with a  $T_c > 26^\circ\text{K}$  for certain compositions falling within the scope of the present claims, it is unclear how someone else skilled in the art would have been enabled to do so at the time the invention was made." The Examiner avoids the essential issues. Even though Applicants' claims do not cover inoperable species, In re Angstadt clearly permits a claim to include

inoperable species where to determine which species works does not require undue experimentation. The Examiner has not met the USPTO's burden of showing that undue experimentation is needed to determine which compositions have  $T_c \geq 26^\circ\text{K}$  and which have  $T_c < 26^\circ\text{K}$  as required by *In re Angstadt*, supra. The Examiner has not presented any substantial evidence that undue experimentation is required to practice Applicants' claim. This is the Examiner's burden. On the other hand, Applicants have presented five affidavits of experts, the book of Poole [Attachment 21] and the article of Rao all of which agree that once a person of skill in the art knows of Applicants' invention, it is straight forward to fabricate other sample. Also, in response to the Examiner's inquiry, "if the Applicants could not show superconductivity with a  $T_c > 26^\circ\text{K}$  for certain compositions falling within the scope of the present claims, it is unclear how someone else skilled in the art would have been enabled to do so at the time the invention was made", it is clear that a person of skill in the art would have been enabled by routine experimentation following Applicants' teaching to determine other samples with  $T_c \geq 26^\circ\text{K}$ . This is all that is required, and there is no evidence in the record to the contrary.

In the prosecution of this application, Applicants have noted that the Examiner has taken a contrary view to Applicants' five affiants each of whom has qualified himself as an expert in the field of ceramic technology and in superconductivity. Also, the Examiners' argument for nonenablement is primarily based on the Examiner "**deeming**" the rejected claims nonenabled based on the unsupported assertion that the art of high  $T_c$  is unpredictable and not theoretically understood, that is, the Examiner's conclusory opinion or belief that the claims are not enabled. In the prosecution of this application Applicants requested the Examiner to submit an affidavit to qualify himself as an expert to conclusorily "**deem**" the rejected claims nonenabled and to substantiate the unsupported assertions. The Examiner has not submitted an affidavit. 37 CFR 104(d)(2) states "[w]hen a rejection in an application is based on facts within the personal knowledge of an employee of the office ... the reference must be

supported when called for by the Applicants, by an affidavit of such employee.”  
(Emphasis Added)

The Examiner further states at page 11-12:

The examples at p. 18, lines 1-20, of the present specification further substantiates the finding that the invention is not fully enabled for the scope presently claimed.

With a 1:1 ratio of (Ba, La) to Cu and an x value of 0.02, the La-,Ba-Cu-O form (i.e., "RE-AE-TM-O" per p. 8/ line 11) shows "no superconductivity", With a 2:1 ratio of (Ba/ La) to Cu and an x value of 0.15, the La-Ba-Cu-O form shows an onset of superconductivity at " $T_c = 26^\circ\text{K}$ ". It should be noted, however, that all of the claims in this application require the critical temperature ( $T_c$ ) to be "in excess of  $26^\circ\text{K}$ " or "greater than  $26^\circ\text{K}$ ".

Applicant respectfully disagrees with the Examiner. All of the claims require  $T_c$  to be greater that of equal to  $26^\circ\text{K}$ .

The Examiner further states at page 12:

The state of the prior art provides evidence for the degree of predictability in the art and is related to the amount of direction or guidance needed in the specification as filed to meet the enablement requirement. The state of the prior art is also related to the need for working examples in the specification. The state of the art for a given technology is not static in time. It is entirely possible that a disclosure filed on January 2, 1990, would not have been enabled. However, if the same disclosure had been filed on January 2, 1996, it might I have enabled the claims. Therefore, the state of the prior art must be evaluated for each application based on its filing date. 35 U.S.C. 112 requires the specification to be enabling only

to a person skilled in the art to which it pertains, or with which it is most nearly connected."

Notwithstanding the Examiner's comments the Examiner has the burden of showing that the claims are not enabled by a reasonable argument which the Examiner has not done. The Examiner has presented no evidence or argument that undue experimentation is required to make composition that can be used to practice in the full scope of Applicants' claims.

The Examiner further states at page 12-13:

The Applicants also have submitted three affidavits attesting to the applicants' status as the discoverers of materials that superconduct > 26°K. Each of the affidavits further states that "all the high temperature superconductors which have been developed based on the work of Bednorz and Muller behave in a similar manner (way)". Each of the affidavits add" (t)hat once a person of skill in the art knows of a specific transition metal oxide composition which is superconducting above 26°K, such a person of skill in the art, using the techniques described in the (present) application, which includes all known principles of ceramic fabrication, can make the transition metal oxide compositions encompassed by (the present) claims ... without undue experimentation or without requiring ingenuity beyond that expected of a person of skill in the art." All three affiants apparently are the employees of the assignee of the present application.

Those affidavits do not set forth particular facts to support the conclusions that all superconductors based on the applicants' work behave in the same way and that one skilled in the art can make those superconductors without undue experimentation. Conclusory statements in an affidavit or specification do not provide the factual evidence needed for patentability.

The Examiner cited *In re Lindner*, 173 USPQ 356, 358 (CCPA 1972) in support of this statement. In *In re Lindner* the patent applicant submitted Rule 132 affidavit based on one example to show unexpected results for a claim of broader scope. The CCPA held that “[i]t is well established that objective evidence of non-obviousness must be commensurate in scope with the claims.” *In re Lindner* is not on point since it does not deal with the issue of enablement. A single example can enable a broader scope claim where nothing more is needed than what is taught by Applicants or what is taught by Applicants together with what is known by a person of skill in the art.

The five affidavits of Mitzi, Tsuei, Dinger, Shaw and Duncombe are statements of experts in the ceramic arts. The Examiner disagrees with these experts. But the Examiner has not submitted an Examiner’s affidavit qualifying himself as an expert to rebut the statements of Applicants’ affiants. Applicants re-request such an Examiner’s affidavit.

The Examiner further states at page 14:

Those affidavits do not overcome the non-enablement rejection. The present specification discloses on its face that only certain oxide compositions of rare earth, alkaline earth, and transition metals made according to certain steps will superconduct at  $> 26^{\circ}\text{K}$ .

Applicants disagree. The affidavits of Shaw [Attachment 19 of the Fifth Supplemental Amendment dated March 1, 2004] and Duncombe [Attachment 20 of the Fifth Supplemental Amendment dated March 1, 2004] cite numerous books and articles which provide the general teaching of ceramic science at the time of and prior to the filing date of the present application. The affidavit of Duncombe also provides several hundred pages copied from Mr. Duncombe’s notebooks starting from before Applicants’ filing date. In regards to these pages, Mr. Duncombe states “I have recorded research notes relating to superconductor oxide (perovskite) compounds in

technical notebook IV with entries from November 12, 1987 to June 14, 1998 and in technical notebook V with entries continuing from June 7, 1988 to May 1989." Mr. Duncombe's affidavit list some of the compounds prepared using the general principles of ceramic science:  $Y_1 Ba_2 Cu_3 O_x$ ,  $Y_1 Ba_2 Cu_3 O_3$ ,  $Bi_{2.15} Sr_{1.98} Ca_{1.7} Cu_2 O_{8+8}$ ,  $Ca_{(2-x)} Sr_x Cu O_x$  and  $Bi_2 Sr_2 Cu O_x$ .

The Examiner further states at page 14:

Those affidavits are not deemed to shed light on the state of the art and enablement at the time the invention was made. One may know now of a material that superconducts at more than 26°K, but the affidavits do not establish the existence of that knowledge on the filing date for the present application. Even if the present application "includes all known principles of ceramic fabrication", those affidavits do not establish the level of skill in the ceramic art as of the filing date of that application.

It is not relevant that Applicants disclosed specific compositions. There is no evidence in the record to indicate that anything more is needed to fabricate compositions which can be used to practice Applicants' invention to the full scope that it is claimed in the present invention. To the contrary, Applicants have shown numerous examples in the affidavits and references of samples fabricated according to Applicants' teaching useful to practice their claimed invention. Notwithstanding, since the claims are apparatus and device claims, Applicants do not believe that they are required to provide a teaching of how to fabricate all compositions which may be used within the full scope of Applicants' claimed invention. This is not required even with respect to claims directed to a chemical composition as clearly stated by *In re Angstadt Facto* 8 supra - "The dissent wants appellants to make everything predictable in advance, which is impracticable and unreasonable." 185 USPQ 152

The Examiner states that "these affidavits are not **deemed** to shed light on the state of the art and enablement at the time the invention was made," that is, it is the



Examiner's conclusory opinion. Applicants disagree. The affidavits clearly state that all that is needed is Applicants' teaching and the ordinary skill of the art to practice Applicants' claimed invention. Also, 35 USC §112, does not require that enablement be determined "at the time the invention was made". This language appears in 35 USC §103, but not in 35 USC §112. Thus it is clear that it was not the intent of Congress to determine enablement at the time the invention was made in the manner suggested by the Examiner. All that is necessary is "[t]he specification shall contain a written description ... to enable any person skilled in the art ... to make and use the same." Applicants initiated the filed of high  $T_c$  superconductors. If a person of skill in the art from the description in Applicants' specification can practice Applicants' claimed invention, it is enabled. Applicants are not required to show that a person of skill in the art had the knowledge prior to Applicants' invention. If this were the case Applicants would not be the first, sole and only inventors, since the invention would be known by others. Applicants teach ceramic processing methods to fabricate high  $T_c$  superconductors. This uses general principles of ceramic science known prior to the filing date of the present application. Thus Applicants' claims are fully enabled. The Examiner has provided no evidence to the contrary. The Examiner has produced no evidence to demonstrate that a person of skill in the art, at the time of Applicants' filing date, could not practice the claimed invention from Applicants' teaching. The utilization of such teaching to practice Applicants' claimed invention was not known prior to Applicants' filing date. That is Applicants' discovery and thus why they are entitled to their claimed invention.

The Examiner further states at page 14:

It is fully understood that the applicants are the pioneers in high temperature metal oxide superconductivity. The finding remains, nonetheless, that the disclosure is not fully enabling for the scope of the present claims.

If Applicants pioneered the field of high T<sub>c</sub> superconductivity, that is, they initiated the substantial worldwide effort to validate their discovery and to synthesize others specific embodiment of their generic and specific teaching, then Applicants should be entitled to generic claims since others based their work on Applicants' teaching.

The Examiner further states at page 15-16:

The applicants quote a statement from "part of the previous Office Action and asserts that the "Examiner does not support this statement with any case law citations." That assertion is incorrect. Seven decisions have been cited as providing the legal basis for this determination of non-enablement.<sup>7</sup>

The Examiner has cited the following seven decisions, which have been discussed in detail above, in support for the determination of non-enablement: In re Fisher, 166 USPQ 18, 24; and In re Angstadt and Griffen, 190 USPQ 214, 218. In re Colianni, 195 USPQ 150, 153, 154 (CCPA 1977). In re Cook, 169 USPQ 298, 302; and Cosden Oil v. American Hoechst, 214 USPQ 244, 262. In re Corkill, 226 USPQ 105, 1009. Brenner v. Manson, 383 US 519, 148 USPQ 689.

The Examiner has not applied the rational of these decisions. In fact, in the prosecution Applicant pointed out that the Examiner seems to have specifically avoided applying this case law and, consequently, Applicants take the Examiner's silence as concurrence in the manner that Applicants have applied this case law. In response to this the Examiner states in the final rejection of the parent application "[n]ot withstanding the Applicants' commentary on case law, the April 15, 1997 Office Action, paper no. 54, sets forth the factual basis for the determination of non-enablement at pp. 5-10." It is Applicants view that the Examiner is misapplying this case law.

The Examiner further states at page 15:

The applicants argue tat their own examples do not support the determination of non-enabling scope of the invention. Nevertheless, the record is viewed as a whole. If the applicants could not show superconductivity with a  $T_c > 26^\circ\text{K}$  for certain compositions falling within the scope of the present claims, it is unclear how someone else skilled in the art would have been enabled to do so at the time the invention was made.

The Examiner incorrectly states "Applicants could not show superconductivity with  $T_c > 26^\circ\text{K}$  for certain compositions falling within the scope of the present claims." The claims of the parent application were directed to a method of flowing a superconducting current in a composition having a  $T_c \geq 26^\circ\text{K}$ . The corresponding claims herein are directed to an apparatus flowing a superconducting current in a composition having a  $T_c \geq 26^\circ\text{K}$ . If a composition has a  $T_c < 26^\circ\text{K}$ , a method or apparatus for flowing a superconducting current in such a compound cannot fall within the scope of Applicants' claims. Applicants are not claiming a composition of matter. They are claiming their discovery, an apparatus passing a superconductive current through a composition, such as a transition metal oxide having a  $T_c \geq 26^\circ\text{K}$ . No one prior to Applicants knew this. That is why they received the Nobel Prize in Physics in 1987.

The Examiner further states at page 15:

The applicants assert that "(b)y the Examiner's statement that these (statements in the affidavits) are conclusionary (sic) the Examiner appears to be placing himself up as an expert in the field of superconductivity" and "respectfully request that the Examiner submit an affidavit in the present application rebutting the position taken by applicants' 3 affiants."

Notwithstanding those assertions, this Examiner has determined that those affidavits were insufficient because they were conclusory only, i.e., they lacked particular facts to support the conclusions reached.

The Examiner further states that Applicants' affidavits are conclusory. The Examiner appears to be placing himself up as an expert in the field of superconductivity. Applicants requested that the Examiner submit an affidavit in the present application rebutting the position taken by Applicants' five affiants, but the Examiner has not submitted an affidavit. The facts are that the five affiants are experts in the art, the Examiner is not. The Examiner states that those "affidavits were insufficient because they were conclusory only, i.e., they lacked particular facts to support the conclusions reached". Applicants submitted the affidavit of Peter Duncombe [Attachment 20 of the Fifth Supplemental Amendment dated March 1, 2004] which has provided hundreds of pages of notebook entries showing that he fabricated superconductive transition metal oxides according to the teaching of Applicants' specification.

The Examiner has provided no substantial evidence to support this assertion of non-enabling scope of the invention. It is requested that the Examiner support his assertion with factual evidence or an Examiner's affidavit and not unsupported statements.

The Examiner is applying an incorrect standard of enablement. The Examiner is applying a standard applicable to composition of matter. Applicants are not claiming a composition of matter. As shown by Applicants' prior comments Applicants have in fact fully enabled the composition of matter. Therefore, Applicants have provided excess enablement for the claimed invention. The standard of enablement for a method of or an apparatus for use is not the same as the standard of enablement for a composition of a matter. Notwithstanding, it is well settled law that claims to a composition of matter can encompass a number of inoperable species. However, Applicants' claims do not cover any inoperable species. The claims only encompass apparatus for flowing a superconducting current in compositions that are superconducting at temperatures  $\geq 26^{\circ}\text{K}$ . Those compositions that are not superconducting at temperatures  $\geq 26^{\circ}\text{K}$  are not encompassed by Applicants' claims reciting these limitations. Applicants note that a

claim to a composition of matter is dominant to any use of that composition of matter and claims directed to an apparatus for use of a composition of matter are necessarily of narrower scope than claims to the composition of matter. Applicants' claims do not encompass uses other than those which the claims are limited to by the use limitations recited in the claims. Applicants' claims are directed to what they have discovered. Therefore, Applicants' claims fully satisfy the requirements of 35 USC 112.

The Examiner further states at page 16:

The applicants argue that the "Examiner has provided no substantial evidence to support this assertion (of non-enabling scope of the invention). It is respectfully requested that the Examiner support (his) assertion with factual evidence and not unsupported statements." Nevertheless, the determination of non-enabling scope is maintained for the reasons of record.

The Examiner has the burden of showing that the claims are not enabled. The Examiner has merely asserted that the theory of high  $T_c$  superconductivity was not understood at the Applicants' priority date. Applicants do not have to have a theory high  $T_c$  superconductivity in order for their teaching to enable their claims. It is only necessary that a person of ordinary skill in the art be able to practice the claimed invention from Applicants' teaching without undue experimentation. The Examiner has not shown that undue experimentation is necessary to practice the claims of Applicants' invention. The Examiner has merely stated that since Applicants' teaching shows that there are materials which are not superconducting with  $T_c \geq 26^\circ\text{K}$ , this is evidence as lack of enablement. Such materials do not come within the scope of Applicants' claims since Applicants' claims only include those materials that are superconducting. Applicants' affidavits have shown that the method of making the materials was well known in the art prior to Applicants' priority date. Thus persons of ordinary skill in the art knew how to make these materials. Which particular compositions have  $T_c \geq 26^\circ\text{K}$

is determined by routine experimentation which is within the skill of the art as stated by Applicants' affidavits.

The Examiner further states at page 16:

The applicants argue that the "standard of enablement for an apparatus is not the same as the standard of enablement for a composition of matter" and that their claimed invention is enabling because it is directed to a method of use rather than a composition. Basis is not seen for that argument, to the extent that it is understood. It is noted that 35 U.S.C. 112, first paragraph, reads as follows:

The Examiner is applying an incorrect standard of enablement. The Examiner is applying a standard applicable to composition of matter. Applicants are not claiming a composition of matter. As shown by Applicants' prior comments Applicants have in fact fully enabled the composition of matter. Therefore, Applicants have provided excess enablement for the claimed invention. The standard of enablement for a method of or an apparatus for use is not the same as the standard of enablement for a composition of a matter. Notwithstanding, it is well settled law that claims to a composition of matter can encompass a number of inoperable species. However, Applicants' claims do not cover any inoperable species. The claims only encompass apparatus for flowing a superconducting current in compositions that are superconducting at temperatures  $\geq 26^{\circ}\text{K}$ . Those compositions that are not superconducting at temperatures  $\geq 26^{\circ}\text{K}$  are not encompassed by Applicants' claims reciting these limitations. Applicants note that a claim to a composition of matter is dominant to any use of that composition of matter and claims directed to an apparatus for use of a composition of matter are necessarily of narrower scope than claims to the composition of matter. Applicants' claims do not encompass uses other than those which the claims are limited to by the use limitations recited in the claims. Applicants' claims are directed to what they have discovered. Therefore, Applicants' claims fully satisfy the requirements of 35 USC 112.

The claimed invention is enabled because it is directed to an apparatus use rather than a composition. Applicants are claiming their discovery, comprising an apparatus comprising a superconducting current in a composition with a  $T_c \geq 26^\circ\text{K}$ . If a patent applicant claims an apparatus for flowing current through a circuit having a resistive element, the applicant does not have to describe every method of making every type of resistive element for the claim to dominate all resistive elements. Such a claim reads on resistive elements made of materials not known at the time of filing since the discovery is not the material but the apparatus for use. Applicants discovered that a superconducting current can be flowed in a composition having a  $T_c \geq 26^\circ\text{K}$ . That is what Applicants are claiming.

Process of use or apparatus for use claims are subject to the statutory provisions of 35 USC 112, first paragraph. All that is necessary to satisfy §112 is the statement that a superconducting current can be passed through a composition, such as a transition metal oxides having a  $T_c \geq 26^\circ\text{K}$ . The Examiner has essentially said this by rejecting Applicants' non-allowed claims as anticipated under §102(a) or obvious under §103(a) in view of the Asahi Shinbum article [Attachment 6 of the Fifth Supplemental Amendment dated March 1, 2004]. Applicants only allowed claim 136 of the parent application corresponding to claim 280 herein was allowed over the Asahi Shinbum article because it showed criticality for the formula recited in this claim. Since Applicants' generic teaching does not prevent others from obtaining patents to specific formulas, Applicants are entitled to generic claims to their discovery. Applicants filed this application soon after their discovery. Applicants availed themselves of the one year grace period under 35 USC 102(b) by publishing their results before filing the present application. This was the quickest way to promote the progress of the field of high  $T_c$  superconductivity which can have substantial societal benefits such as less expensive electric power and more effective medical diagnostic tools. It is a policy of the United States Constitution, which establishes the United States Patent System, to encourage early disclosure of inventions to promote the progress of the useful arts. The Examiner's position that Applicants' generic claims are not fully enabled frustrates this policy. Applicants could have decided not to publish Applicants' article and not to

file the present application while engaging in years of further experimentation to find all specific examples which had the optimal  $T_c$ . If Applicants acted this way, there would not have been the explosive worldwide effort to fully explore and implement high  $T_c$  transition metal oxide technology. The rationale used by the Examiner is contrary to the Constitutional policy to promote the progress of the useful arts by early disclosure of an invention and contrary to the CCPA decision in *In re Angstadt*. Early disclosure should not be a penalty to Applicants. Applicants are pioneers in discovering that compositions, such as, transition metal oxides, have  $T_c \geq 26^\circ\text{K}$ . A first discoverer of a wheel whose specific embodiment is a solid disc rotateable about an axle can claim a cylindrical member adapted for rotation about the axle and for rolling on a surface, that is, their discovery. This claim is dominant to a latter inventor's improved wheel comprising spokes which has the advantage of much lighter weight than a disc. The latter inventor is entitled to subservient claim to the dominant claim to a wheel. Applicants are entitled to a dominant claim to their discovery. The Examiner's rationale would preclude this.

The Examiner further states at page 16:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same, and shall set forth the best mode contemplated by the inventor of carrying out his invention. Apparatus claims also would be subject to the statutory provisions of 35 U.S.C. 112, first paragraph.

Applicants' invention is a device and a method of operation of a device having a  $T_c \geq 26^\circ\text{K}$ . Applicants discovered that materials had a  $T_c \geq 26^\circ\text{K}$ . Applicants did not discover how to make these materials, which was well known prior to Applicants' priority date. Also, it was well known prior to applicant's priority date how to cause superconducting currents in materials having a  $T_c$  at lower temperatures. Applicants do



not have to specifically enable every composition that come within the scope of their claims. Applicants only have to provide a teaching based on which those compositions can be made by a person of ordinary skill in the art with out undue experimentation.

The Examiner further states at page 17:

The applicants assert that the "Examiner has not shown by evidence not contained within applicants' teaching that the art of high  $T_c$  superconductors is unpredictable in view of applicants' teaching" (spelling and punctuation errors corrected). To the extent that the same assertion is understood, the rejection is maintained for the reasons of record.

Applicants' statement is very clear. The Examiner is trying to avoid the issue since the Examiner has not shown by evidence not contained within Applicants' teaching that the art of high  $T_c$  superconductors is unpredictable. The Examiner has merely "**deemed**" it to be so.

The Examiner further states at page 17:

The applicants point to "Copper Oxide Superconductors" by Charles P. Pooler Jr., et al., (hereinafter, "the Poole article") as supporting their position that higher temperature superconductors were not that difficult to make after their original discovery.

Initially however, it should be noted that the Poole article was published after the priority date presently claimed. As such, it does not provide evidence of the state of the art at the time the presently claimed invention was made.

Applicants have extensively referred to "Copper Oxide Superconductors" by Charles P. Poole, Jr., et al., (hereinafter, "the Poole book" or "the Poole article")

[Attachment 21 of the Fifth Supplemental Amendment dated March 1, 2004]) as supporting their position that higher temperature superconductors were not that difficult to make after their original discovery. This is because methods of making compositions which could be used to practice Applicants' claimed invention were well known prior to Applicants' discovery that metal oxides had a  $T_c \geq 26^\circ\text{K}$ . In response the Examiner states "Initially, however, it should be noted that the Poole article [Attachment 21 of the Fifth Supplemental Amendment dated March 1, 2004] was published after the priority date presently claimed". It is not relevant that the Poole article [Attachment 21 of the Fifth Supplemental Amendment dated March 1, 2004] was published after the priority date since it is clear evidence that only routine experimentation was needed to practice Applicants' claimed invention and there is no indication that anything more than Applicants' teaching is needed. The Examiner further comments on the Poole book [Attachment 21 of the Fifth Supplemental Amendment dated March 1, 2004] stating, "[a]s such, it does not provide evidence of the state of the art at the time the presently claimed invention was made". As noted in the substitute brief of the parent application, Poole clearly states that the materials that can be used within the scope of Applicants' claims were easily made. And as stated above the Examiner has acknowledged that the fabrication techniques were well known prior to Applicants' invention. Poole states that is why so much work was done in so short a period of time. This is clear and convincing evidence that persons of skill in the art were fully enabled by Applicants' teaching to practice Applicants' claimed invention. It is not necessary for Applicants to show that the data was generated prior to Applicants' filing date. The CCPA in *In re Angstadt*, supra, clear states this is not required. The Examiner has not stated, nor is there any evidence presented by the Examiner, nor is there any indication in the Poole book that anything more than what Applicants taught was necessary to practice Applicants' claimed invention. It is only necessary that persons of skill in the art can practice Applicants' claimed invention from Applicants' teaching without undue experimentation. As stated in *In re Angstadt* there is no requirement for Applicants to prove that the experimentation to make compositions to practice Applicants' claimed invention is undue just because some experimentation is needed to select compositions

that come within the scope of the Applicants claims. The Examiner is not applying the standard of *In re Angstadt*.

The Examiner further states at page 18:

Finally, the Preface states in part at A3: "The unprecedented worldwide effort in superconductivity research that has taken place over the past two years has produced an enormous amount of experimental data on the properties of the copper oxide type materials that exhibit superconductivity above the temperature of liquid nitrogen. During this period a consistent experimental description of many of the properties of the principal superconducting compounds such as BiSrCaCuO, LaSrCuO, TlBaCaCuO and YBaCuO has emerged, The field of high-temperature superconductivity is still evolving ..." That preface is deemed to show that the field of high-temperature superconductivity continued to grow, on the basis of on-going basic research, after the Bednorz and Mueller article was published.

The continued growth referred to in the passage from Poole et al. [Attachment 21 of the Fifth Supplemental Amendment dated March 1, 2004] quoted above does not mean that this work is not based on Applicants' initial fundamental teaching. Poole et al. as quoted above states that the unprecedented amount of work done in the short period of time after Applicants' work was because the materials "are not difficult to synthesize." Moreover, as quoted above the CCPA *In re Fisher* 166 USPQ 1-8, supra, states "such an inventor should be allowed to dominate future patentable inventions of other where those inventors were based on in some way on his teachings." Moreover, the referred to future developments in the passage above are not necessarily patentably distinct from Applicants' teachings. Those who developed these compounds would have a reasonable expectation of success based on Applicants' teaching. The Examiner has provided no evidence to the contrary.

The first (BiSrCaCuO) and third (TiBaCaCuO) of these compositions does not come within the scope of the claims allowed by the examiner since they do not contain a rare earth or group III B element, even though Poole states that they are easy to make following the general principals of ceramic science as taught by Applicants.

Other data supporting Applicants' view is reported in the Review Article "Synthesis of Cuprate Superconductors" by Rao et al., IOP Publishing Ltd. 1993. A copy of this article is in Attachment C of the response submitted August 4, 2000. This article lists in Table 1 the properties of 29 superconductors made according to Applicants' teaching. Twelve (#'s 1, 8-13, 16, 17, 20, 21, 27 and 28) of those listed do not come within the scope of the claims allowed by the examiner. Only three of the 29 have a  $T_c < 26^\circ\text{K}$ . Those twelve do not contain one or more of a rare earth, a group III B element or an alkaline earth element. It is thus clear that broader claims than allowed should be allowed since it is clear that the allowed claims can be avoided following Applicants' teaching without undue experimentation. Applicants are entitled to claims which encompass these materials since they were made following Applicants' teaching.

The article of Rao et al. in the first sentence of the introduction citing Applicants' article - which is incorporated by reference in their application - acknowledges that Applicants initiated the field of high  $T_c$  superconductivity. Applicants further note that the Rao article acknowledges that "a large variety of oxides" are prepared by the general principles of ceramic science and that Applicants discovered that metal oxides are high  $T_c$  superconductors.

Citing reference 5 therein - the book "New Directions in Solid State Chemistry", Rao et al. 1989 (Cambridge; Cambridge University Press) for which there is a 1986 edition which predates Applicants' filing date (See Attachment B of the Response submitted August 4, 2000), Rao et al. states:

Several methods of synthesis have been employed for preparing cuprates, with the objective of obtaining pure monophasic products with

good superconducting characteristics [3, 4]. The most common method of synthesis of cuprate superconductors is the traditional ceramic method which has been employed for the preparation of a large variety of oxide materials [5]. Although the ceramic method has yielded many of the cuprates with satisfactory characteristics, different synthetic strategies have become necessary in order to control factors such as the cation composition, oxygen stoichiometry, cation oxidation states and carrier concentration. Specifically noteworthy amongst these methods are chemical or solution routes which permit better mixing of the constituent cations in order to reduce the diffusion distance in the solid state [5, 6]. Such methods include coprecipitation, use of precursors, the sol-gel method and the use of alkali fluxes. The combustion method or self-propagating high-temperature synthesis (SHS) has also been employed.

Reference 5 is another example of a reference to the general principles of ceramic science incorporated into Applicants' teaching. The Rao et al. article states that the 29 materials reported on in the article and listed in Table 1 are fabricated using the general principles of ceramic science. Moreover, the Rao article states that these materials are fabricated by what the Rao article calls the "ceramic method" which is the preferred embodiment in Applicants' specification, yet 12 of the 29 materials in Table 1 do not come within the scope of the claims allowed by the examiner. Thus known examples fabricated according to Applicants' teaching will not be literally infringed by the Rao, Duncombe and Poole examples.

The Examiner further states at page 18-20:

The applicants submitted three affidavits, one each from Drs. Tsuei, Dinger and Mitzi which were signed in May of 1998. Except for one change, those three affidavits are the same as the ones submitted before and discussed above.

Those affidavits have been changed to indicate that the present application "includes all known principles of ceramic fabrication known at the time the application was filed."

However, the additional indication also is considered to be a conclusory statement unsupported by particular evidence.

The Examiner further states at page 19:

Application have submitted three affidavits attesting to the applicants' status as the discoverers of materials that superconduct  $> 26^{\circ}\text{K}$ . Each of the affidavits states that "all the high temperature superconductors which have been developed based on the work of Bednorz and Mueller behave in a similar manner (way)". Each of the affidavits add "(t)hat once a person of skill in the art knows of a specific transition metal oxide composition which is superconducting above  $26^{\circ}\text{K}$ , such a person of skill in the art, using the techniques described in the (present) application, which includes all known principles of ceramic fabrication, can make the transition metal oxide compositions encompassed by (the present) claims ... without undue experimentation or without requiring ingenuity beyond that expected of a person of skill in the art.

It is the examiner's maintained position that while general principles of ceramic fabrication were most certainly known prior to the filing date of the instant application, the utilization of such techniques to produce superconductive materials within the scope of the instant claims were not known. The affidavits are not effective to demonstrate enablement at the time the invention was made. As stated in paper #66, page 8, one

may now know of a material that superconducts at more than 26°K, but the affidavits do not establish the existence of that knowledge on the filing date of the present application.

Applicants have submitted five affidavits. The Examiner acknowledges that the fabrication techniques necessary to practice Applicants' invention were known prior to the filing date of the present application. But the Examiner further states that the "utilization of such techniques to produce superconductive materials within the scope of the instant claims were not known". The scope of the instant claim is an apparatus for flowing a superconductive current in a transition metal oxide having a  $T_c \geq 26^\circ\text{K}$ . That is Applicants' discovery. That is why it was not known prior to Applicants' discovery. How to make this type of material was known. Prior to Applicants' discovery, it was not known that they were superconductive with a  $T_c \geq 26^\circ\text{K}$ . The Examiner incorrectly states "one may now learn of a material that superconducts at more than 26°K, but the affidavits do not establish the existence of that knowledge on the filing date of the present invention." If that knowledge was known by another prior to the filing date, Applicants would not have a patentable invention since they would not be the initial first and sole inventor. Moreover, according to the CCPA in *In re Angstadt Supra*. Applicants' teaching do not have to teach all examples that come within the scope of their claims in advance. See *In re Angstadt* Factor 7 and 8 above. The affidavits state that the knowledge of how to make compositions within the scope of Applicants' claims, such as transition metal oxides, by the general principles of ceramic science were known prior to the filing date. In particular, the affidavits of Duncombe [Attachment 20 of the Fifth Supplemental Amendment dated March 1, 2004] and Shaw [Attachment 19 of the Fifth Supplemental Amendment dated March 1, 2004] refer to a number of articles and texts on the general principles of ceramic science. One of these texts is "Structures, Properties and Preparation of Perovskite-type Compounds", F.S. Galasso (1969).

Applicants note that the book "Copper Oxide Superconductors" by Charles P. Poole, Jr., Timir Datta and Horacio A. Farach, John Wiley & Sons (1998) [Attachment

21 of the Fifth Supplemental Amendment dated March 1, 2004] support their position that high temperature superconductors were not difficult to make after their original discovery. This book shall be referred to herein as Poole et al. or the Poole book . The Poole book was published after Applicants' initial discovery which was published in Applicants' article. The Examiner states "[a]s such, it does not, provide evidence of the state of the art at the time the presently claimed invention was made".

Applicants disagree. The preface of this book says "[t]his volume reviews the experimental aspects of the field of oxide superconductivity with transition temperatures from 30K to above 123K, from the time of its discovery by Bednorz and Muller in April, 1986 until a few months after the award of the Nobel Prize to them in October, 1987." Thus the book reports on work done within eighteen months of Applicants' discovery in April 1986 and within eleven months of its publication in September, 1986. In the present application was filed on May 22, 1987. This passage is referring to Applicants and Applicants' article [Attachment 3 of the Fifth Supplemental Amendment dated March 1, 2004] referred to at page 6 of Applicants' specification. This book acknowledges that Applicants are the discoverers of the field of high temperature superconductivity. (See Attachment A of Applicants' response dated May 14, 1998 [Attachment 23 of the Fifth Supplemental Amendment dated March 1, 2004] and See Attachment H of Applicants' response dated November 28, 1997 [Attachment 24 of the Fifth Supplemental Amendment dated March 1, 2004]). The Examiner's view that the skill of the art was insufficient at the time of the filing date of the present application is untenable in the view of Poole et al. and Applicants' 132 affidavits of Tsuei [Attachment 18 of the Fifth Supplemental Amendment dated March 1, 2004], Mitzi [Attachment 16 of the Fifth Supplemental Amendment dated March 1, 2004], Shaw [Attachment 19 of the Fifth Supplemental Amendment dated March 1, 2004], Dinger [Attachment 17 of the Fifth Supplemental Amendment dated March 1, 2004] and Duncombe [Attachment 20 of the Fifth Supplemental Amendment dated March 1, 2004], in particular that of Peter Duncombe which reports data prior to the Applicants' filing date.



Applicants note that it is generally recognized that it is not difficult to fabricate transition metal oxides and in particular copper metal oxides that are superconductive after the discovery by Applicants of composition, such as transition metal oxides, are high  $T_c$  superconductors. Chapter 5 of the Poole et al. [Attachment 21 of the Fifth Supplemental Amendment dated March 1, 2004] book entitled "Preparation and Characterization of Samples" states at page 59 "[c]opper oxide superconductors with a purity sufficient to exhibit zero resistivity or to demonstrate levitation (Early) are not difficult to synthesize. We believe that this is at least partially responsible for the explosive worldwide growth in these materials". Poole et al. further states at page 61 "[i]n this section three methods of preparation will be described, namely, the solid state, the coprecipitation, and the sol-gel techniques (Hatfi). The widely used solid-state technique permits off-the-shelf chemicals to be directly calcined into superconductors, and it requires little familiarity with the subtle physicochemical process involved in the transformation of a mixture of compounds into a superconductor." Poole et al. further states at pages 61-62 "[i]n the solid state reaction technique one starts with oxygen-rich compounds of the desired components such as oxides, nitrates or carbonates of Ba, Bi, La, Sr, Ti, Y or other elements. ... These compounds are mixed in the desired atomic ratios and ground to a fine powder to facilitate the calcination process. Then these room-temperature-stable salts are reacted by calcination for an extended period (~20hr) at elevated temperatures (~900°C). This process may be repeated several times, with pulverizing and mixing of the partially calcined material at each step." This is generally the same as the specific examples provided by Applicants and as generally described at pages 8, line 19, to page 9, line 5, of Applicants' specification which states "[t]he methods by which these superconductive compositions can be made can use known principals of ceramic fabrication, including the mixing of powders containing the rare earth or rare earth-like, alkaline earth, and transition metal elements, coprecipitation of these materials, and heating steps in oxygen or air. A particularly suitable superconducting material in accordance with this invention is one containing copper as the transition metal." (See Attachment A of Applicants' response dated May 14, 1998 [Attachment 23 of the Fifth Supplemental Amendment dated March 1, 2004] and See Attachment H of Applicants' response dated November 28, 1997 [Attachment

24 of the Fifth Supplemental Amendment dated March 1, 2004]). Consequently, Applicants have fully enabled high  $T_c$  transition metal oxides and their claims.

As stated in the affidavit of Dr. Mitzi [Attachment 16 of the Fifth Supplemental Amendment dated March 1, 2004], Dr. Dinger [Attachment 17 of the Fifth Supplemental Amendment dated March 1, 2004], Dr. Tsuei [Attachment 18 of the Fifth Supplemental Amendment dated March 1, 2004], Dr. Shaw [Attachment 19 of the Fifth Supplemental Amendment dated March 1, 2004] and Mr. Doncombe [Attachment 20 of the Fifth Supplemental Amendment dated March 1, 2004] the preface of the book by Poole et al., quoted above, the work of Applicants initiated the field of high temperature superconductors and these materials are not difficult to synthesize. And according In re Fisher “it is apparent that such an inventor should be allowed to dominate future patentable inventions of others where those inventions were based in some way on his teaching.” (166 USPQ 18, 24)

The Examiner further states at page 20:

A key issue that can arise when determining whether the specification is enabling is whether the starting materials or apparatus necessary to make the invention are available. In the biotechnical area, this is often true when the product or process requires a particular strain of microorganism and when the microorganism is available only after extensive screening. The Court in In re Ghiron, 442 F.2d 985, 991, 169 USPQ 723, 727 (CCPA 1971), made clear that if the practice of a method requires a particular apparatus, the application must provide a sufficient disclosure of the apparatus if the apparatus is not readily available. The same can be said if certain chemicals are required to make a compound or practice a chemical process. In re Howarth, 654 F.2d 103, 105, 210 USPQ 689, 691 (CCPA 1981).

The examiner respectfully maintains, for the reasons of record, that the disclosure is not fully enabling for the scope of the present claims.

The Examiner cites *In re Ghiron*, 169 USPQ 723, 727 stating *In re Ghiron* "made it clear that if practice of a method requires a particular apparatus, the application must provide a sufficient disclosure of the apparatus if the apparatus is not readily available." No special apparatus is needed to practice Applicants' claimed invention since the apparatus was readily available before inventor's priority date. For example, see "Theory of Superconductivity" M. Von Laue, Academic Press, Inc., 1952 [Attachment 15 of the Fifth Supplemental Amendment dated March 1, 2004].

The Examiner citing *In re Howarth* 210 USPQ 689, 691 states "The same can be said if certain chemicals are required to make a compound or practice a chemical process." Firstly, the claims of the present invention are not directed to a chemical process. *In re Howarth* at 210 USPQ 689, 692, The United States Supreme Court citing *Webster v. Higgins* 105 US 580, 586 states an applicant "may begin at the point where his invention begins, and describe what he has made that is new and what it replaces of the old. That which is common and well known is as if it were written out in the patent and delineated in the drawings." In the present invention how to create a superconducting current is well not known in the art before Applicants' priority date. The process for making the compounds through which the apparatus of Applicants' claims carry the superconducting current is not new. What is new is Applicants' discovery that materials exist having a  $T_c \geq 26^\circ\text{K}$ . This is what Applicants are claiming, their discovery of an apparatus carrying a superconductive current at a  $T_c \geq 26^\circ\text{K}$ . *In re Howarth* states at 210 USPQ 689, 691 "an inventor need not ... explain every detail since he is speaking to those skilled in the art. What is conventional knowledge will be read into the disclosure." The Examiner has not shown what information is missing from Applicants' specification that is not known to person of skill in the art prior to Applicants' priority date that is necessary for a person of skill in the art to practice Applicants' claimed invention. Specific examples that are not specifically identified in

Applicants' specification that have  $T_c \geq 26^\circ\text{K}$  that can be made according to Applicants' teaching are enabled according to the CCPA in *In re Angstadt*, supra.

Applicants gratefully acknowledge the allowance of claims 113, 114, 123-125, 135-138, 140, 151, 157, 167-169, 172-174, 177-179, 185, 186, 189-191, 196, 197, 213-216, 220, 221, 224-226, 231, 258-260, 264, 265, 269, 270, 276, 277, 280-282, 287, 288, 296-301, 304-307, 311, 312 and 315-317.

## REMARKS IN REGARD TO REJECTIONS OVER THE ASAHI SHINBUM ARTICLE

Claims 1, 12-31, 33-38, 40-46, 55-59, 64, 69-72, 77-81, 84-86, 91-96, 103, 109, 111-116, 119, 120 and 124 were rejected in the Office Action dated July 30, 1998 as obvious over the Asahi Shinbum Article. Only claim 123 was allowed in that Office Action. Since this was a rejection for obviousness over a single reference that means that a person of ordinary skill in the art as, according to the Examiner, enabled to practice the claimed invention from the teaching of the Asahi Shinbum Article and what is generally known to a person of ordinary skill in the art. The Examiner's rejection of claims for lack of enablement is inconsistent with the obviousness rejection over the Asahi Shinbum Article.

Applicants acknowledge the withdrawal of the prior art rejection over Asahi Shinbum, International Satellite Edition (London), November 28, 1986 (hereinafter, "the Asahi Shinbum article") in view of the remarks in Applicants' prior response. The Examiner states at page 2 "Applicant has sufficiently demonstrated conception, diligence and reduction to practice of the instant invention before the publication date of the Asahi Shinbum article." Applicants respectfully submit that the Examiner has not withdrawn the rejection but has found the rejection moot in view of the fact that the Examiner has agreed that Applicant has sufficiently demonstrated conception before the publication date of the Asahi Shinbum article in the United States and diligence to a reduction to practice of the instant invention.

The Examiner has not commented on nor rebutted Applicants' argument that in rejecting claims under 35 USC 103 over the Asahi Shinbum article, the Examiner necessarily concludes that Applicants' claims are fully enabled. The Asahi Shinbum article refers to Applicants' work which was reported in their original article which is incorporated by reference in Applicants' specification. **Since Applicants' original article is the only information enabling the Asahi Shinbum article, it logically follows that the Examiner necessarily concludes that all Applicants' claims are fully enabled.**

Thus in the Office Action of 7-30-98, the Examiner is stating that everything within Applicants' non-allowed claims rejected under 35 USC 103 over the Asahi Shinbum article alone can be practiced by a person of skill in the art with what is taught in the Asahi Shinbum article in combination with what is known to a person of skill in the art. All of Applicants' claims rejected over the Asahi Shinbum article are dominant to (or generic to) the one claim, claim 123, allowed in the Office Action of 7-30-98. Thus by stating that all the non-allowed claims are obvious over the Asahi Shinbum article alone, the Examiner is stating that a person of skill in the art needs nothing more than what is taught in the Asahi Shinbum article or what is taught therein in combination with what is known to a person of skill in the art to practice that part of each of Applicants' non-allowed claims which does not overlap allowed claim 123. Thus, it logically follows from the 35 USC 103 rejections that all of Applicants' claims are fully enabled.

The Asahi Shinbum article states in the first paragraph:

A new ceramic with a very high  $T_c$  of 30K of the superconducting transition has been found. The possibility of high  $T_c$  - superconductivity has been reported by scientists in Switzerland this spring. The group of Prof. Shoji TANAKA, Dept. Appl. Phys. Faculty of Engineering at the University of Tokyo confirmed in November, that this is true.

and in the second paragraph:

The ceramic newly discovered, is an oxide compound of La and Cu with Barium which has a structure of the so-called perovskite and shows metal-like properties. Prof. Tanaka's laboratory confirmed that this material shows diamagnetism (Meissner effect) which is the most important indication of the existence of superconductivity.

The Swiss scientist are the inventors of the present application. Thus this clearly refers to Applicants work which was reported in Applicants' article which is incorporated by reference in the present application. These passages say that Prof. Tanaka confirmed Applicants work. The newly discovered ceramic referred to in the article is the ceramic reported on in Applicants' article. It is thus clear that for the Examiner to have rejected Applicants claim over the Asahi Shinbum article under 35 USC 103, the Examiner necessarily had to find that Applicants' article fully enabled their claims.

In the Office Action the Examiner has not commented on nor rebutted these arguments which are in Applicants' prior responses, included in the Fifth Supplementary Amendment dated March 1, 2004. The Examiner, therefore, must be taken to agree with Applicants argument in the prior response that their teaching has fully enabled all of their claims.

At the beginning of Applicants' arguments in the Fifth Supplementary Amendment dated March 1, 2004, in regard to the objections and rejection based on 35 USC 112, first paragraph, Applicants' have repeated these arguments, that is that the 35 USC 103 rejections over the Asahi Shinbum article logically requires that all of Applicants' claims are fully enabled by Applicants' teaching. The Examiner has again not responded nor rebutted them. The Examiner, therefore, must be taken to agree with Applicants argument in the response of March 1, 2004 that their teaching has fully enabled all of their claims.

The Examiners rejections under 35 USC 103 over the Asahi Shinbum articles have been maintained since the Office Action dated August 26, 1992 of the parent application. Thus the Examiner has maintained the view that all of Applicants' claims are fully enabled for about twelve years. Thus the specification provides an enabling disclosure of all of Applicants' claims.

## REMARKS CITING PORTIONS OF THE FILE HISTORY

Claims of the present application have been rejected as not enabled under 35 U.S.C. 112, first paragraph. Applicants disagree for the reasons previously noted. Applicants in addition point out the following.

The present application is a Continuation of 08/060,470 filed on 05/11/93, which is a Continuation of 07/875,003 filed on 04/24/92, which is a Divisional of 07/053,307 filed on 05/22/87 all now abandoned.

In the 07/053,307 ancestral application composition of matter claims where presented for examination. A copy of the Final Rejection referred to below in this application is in Attachment 57 of this paper.

In the 07/053,307 ancestral application composition of matter, claims 1 through 11 inclusive, 27 through 35 inclusive, 40 through 54 inclusive, 60 through 63 inclusive, and 65 through 68 were finally rejected under 35 U.S.C. 102(b) or in the alternative under 35 U.S.C. 103 as unpatentable over each of a publication by Shaplygin et al. in the Russian Journal of Inorganic Chemistry, volume 24, pages 820-824 (1979) ("the Shaplygin et al. publication"); a publication by Nguyen et al. in the Journal of Solid State Chemistry, volume 39, pages 120-127 (1981) ("the Nguyen et al. publication"); a publication by Michel et al. in the Materials Research Bulletin, volume 20, pages 667-671 (1985) ("the 1985 Michel et al. publication"); and a publication by Michel and Raveau in the Revue de Chimie Minerale, volume 21, pages 407-425 (1984) ("the 1984 Michel and Raveau publication"). See the final rejection dated 4-25-1991 in the 07/053,307 ancestral application.

In the 07/053,307 ancestral application, claims 1, 2, 5 through 11 inclusive, 40 through 44 inclusive, 46, 48, 51 through 54 inclusive, 60, 62, and 66 were finally rejected under 35 U.S.C. 102(b) or in the alternative under 35 U.S.C. 103 as unpatentable over a publication by Perron-Simon et al. in C. R. Acad. Sc. Paris, volume



283, pages 33 through 35 (12 July 1976) ("the Perron-Simon et al. publication"); a publication by Mossner and Kemmler-Scak in the Journal of the Less-Common Metals, volume 105, pages 165 through 168 (1985) ("the Mossner and Kemmler-Sack publication"); a publication by Chincholkar and Vyawahare in Thermal Analysis 6th, volume 2, pages 251 through 256 (1980) ("the Chincholkar and Vyawahare publication"); a publication by Ahmad and Sanyal in Spectroscopy Letters, volume 9, pages 39 through 55 (1976) ("the Ahmad and Sanyal publication"); a publication by Blasse and Corsmit in the Journal of Solid State Chemistry, volume 6, pages 513 through 518 (1973) ("the Blasse and Corsmit publication"); United States Patent No. 3,472,779 to Kurihara et al. ("the Kurihara et al. '779 patent"); a publication by Anderton and Sale in Powder Metallurgy No. 1, pages 14 through 21 (1979) ("the Anderton and Sale publication"). (See the final rejection dated 4-25-1991).

In the 07/053,307 ancestral application the Examiner asserted that the cited references appeared to disclose materials, which inherently provided superconductive properties and consequently therefore, rendered the claims unpatentable. Applicants rebutted the Examiner's reasons for rejection based on limitations in the claims directed to Applicants' new discovery of the superconductive properties of these materials.

The claims of the present application are directed to apparatus for flowing a superconducting current in a superconductive composition of matter having a transition temperature greater than or equal to 26°K. This is Applicants' discovery for which they received the 1987 Nobel Prize in Physics. The Examiner in the 07/053,307 ancestral application stated by the 35 U.S.C. 102 and 103 rejections therein that persons of skill in the art knew how to make the compositions of matter based on the references cited therein. In that same final rejection the Examiner states at page 4 thereof "these materials appear to be identical to those presently claimed except that the superconductive properties are not disclosed." Applicants discovered the superconductive properties and in the present application are claiming apparatus using this property. Thus, by the Examiner's reasoning all of the present claims are fully enabled because the Examiner has stated that the compositions of matter recited in the

claims can be made with the knowledge of a person of skill in the art prior to Applicant's filing date. Thus the Examiner, in the 07/053,307 ancestral application, agrees with the Applicants' Arguments and the Affidavits of Shaw, Duncombe, Tsuei, Dinger and Mitzi submitted by Applicants in support of their position that all their claims are enabled. In view thereof, Applicants respectfully request the Examiner to withdraw the rejection of the claims under 35 U.S.C. 112, first paragraph as not enabled.

Claims herein have been rejected as indefinite under 35 U.S.C. 112, second paragraph.

These claims have been rejected under 35 USC 112, second paragraph, as indefinite for using language of the type "rare earth like" and "pervskite-like", etc. As previously stated the Examiner has arbitrarily rejected Applicants' claims without providing a reason for why Applicants' terms are indefinite while similar terms are not indefinite in the claims of many issued patents. Applicants note that article incorporated by reference at page 6 of the specification were published in September 1986 (which lead to Applicants' Nobel Prize) and the present application was filed in May 1987 thereby clearly making this terminology part the high  $T_c$  superconductor art. As shown this is the vernacular of the field and well understood by persons of skill in the art. Applicants request withdrawal of the rejections of claims under 35 U.S.C. 112, second paragraph.

Applicants' invention is a pioneering invention. "The Supreme Court in *Westinghouse v. Boyden Power Brake Co.*, 170 U.S. 537, 562 (1898), characterized a pioneering invention as "a distinct step in the progress of the art, distinguished from a mere improvement or perfection of what had gone before." *Texas Instruments ICC 6 USPQ 2d 1886 (CAFC 1988)*. Applicants received the 1987 Nobel Prize in Physics for there discovery of superconductivity at  $T_c$  greater that or equal to 26°K which is about 8 °K higher than the highest  $T_c$  previously known. Even though others following Applicants' teaching identified compositions having  $T_c$  more than 100°K greater than

26°K only Applicants have received a Nobel Prize for this subject matter. This is because the others followed Applicants' teaching to identify these other compositions.

Applicants respectfully request the Examiner to withdraw rejections of claims under 35 USC 112, first paragraph and second paragraph.

## **SUMMARY OF THE QUESTIONS RAISED BY THIS PROSECUTION**

A number of Applicants' claims have been rejected under 35 USC 112, first paragraph, as not enabled by Applicants' specification. The Examiner has given these reasons in support of this rejection: 1) the Examiner's unsupported statements that the art of high  $T_c$  superconductivity is unpredictable; 2) the Examiner's unsupported statement that the theory of high  $T_c$  superconductivity is not well understood; and 3) the Examiner points to examples cited in Applicants' specification which do not show superconductivity greater than or equal to 26°K. The Examiner has provided no support for reasons 1 and 2 in response to Applicants' request that the Examiner provide evidence in support thereof or an Examiner's Affidavit in support thereof as required by 37 CFR 104(d)(2). The Examiner provided neither. Thus, reasons 1 and 2 are the Examiner's unsupported opinion. Applicants' examples that do not have a  $T_c$  m 26°K (Reason 3) do not support the Examiner's lack of enablement rejection in view of the decisions cited by Applicants, in particular, *In re Angstadt*, *Amgen v. Chugai Pharmaceutical Co.* and *In re Wands*. Applicants have provided extensive evidence in support of their view that their claims are enabled: 1) the five affidavits of Tzui, Dinger, Duncombe, Shaw and Mitzi, 2) the books and articles cited in these affidavits, 3) the book of Poole that states that the reason so much work was done in such a short period of time after Applicants' first discovery was that the high  $T_c$  materials were easy to make using well known fabrication techniques, 4) the article of Rao et al. entitled "Synthesis of Cuprate Superconductors" which cite numerous species of high  $T_c$  materials which can be made according to Applicants' teaching and 5) the CRC Handbook of Chemistry and Physics which cites numerous species of high  $T_c$  materials which can be made according to Applicants' teaching. Many of the species in 4 and 5 are not specifically recited in Applicants' specification, but they come within the genus of Applicants' claims that have been rejected as not enabled. Moreover, there is no evidence of record that a person of skill in the art cannot, without undue experimentation, make these species following Applicants' teaching. The Examiner has not denied that Applicants' extensive proof shows that a person of skill in the art can fabricate these species following Applicants' teaching. Under *In re Angstadt* and *In re Wands* it is Examiner's burden to

establish that undue experimentation is needed to practice Applicants' claimed invention. The Examiner has made no attempt to satisfy this burden.

As stated all of Applicants' claims except for one was rejected in the final rejection of the parent application as anticipated or obvious over the Asahi Shinbum article under 35 USC 103. In the Examiner's Answer in the parent application, these rejections were found moot in view of the Examiner agreeing that Applicants effectively swore behind the date of this article. The Examiner has not withdrawn the 35 USC 103 rejections. Thus as alleged by Applicants from very early in the prosecution of this application, by these rejections, the Examiner has necessarily and unambiguously found all of Applicants' claims enabled. As stated, the Asahi Shinbum article [Attachment 6 of the Fifth Supplemental Amendment dated March 1, 2004] derives its enablement from Applicants' publication [Attachment 3 of the Fifth Supplemental Amendment dated March 1, 2004] which was published less than a year before Applicants' filing date and which is incorporated by reference in Applicants' specification. For a reference to anticipate a claimed invention the reference must enable from the teaching therein a person of skill in the art to practice the alleged anticipated claims and for a single reference to render obvious a claimed invention the single reference must enable a person of skill in the art to practice the alleged obvious claims from the teaching of that reference in combination with what is know to a person of skill in the art. Thus, all of Applicants' claims that were rejected under 35 USC 102 and 103 over the Asahi Shinbum article must be fully enabled by the Examiner's own rational.

Applicants' claims have been rejected under 35 USC 112, second paragraph, as indefinite for using language of the type "rare earth like" and "pervskite-like", etc. As shown by Applicants, the claims of many issued US Patents use such terms. The Examiner has arbitrarily rejected Applicants' claims without providing a reason for why Applicants' terms are indefinite while similar terms are not indefinite in the claims of these many issued patents.

In view of the changes to the claims and the remarks herein, the Examiner is respectfully requested to reconsider the above-identified application. If the Examiner wishes to discuss the application further, or if additional information would be required, the undersigned will cooperate fully to assist in the prosecution of this application.

Please charge any fee necessary to enter this paper and any previous paper to deposit account 09-0468.

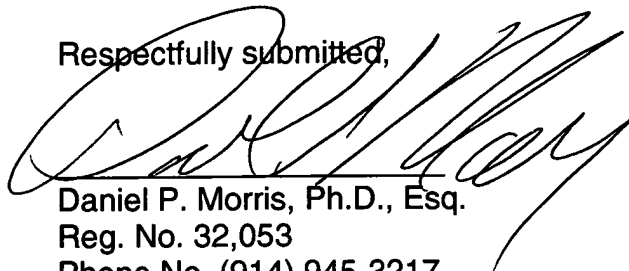
If the above-identified Examiner's Action is a final Action, and if the above-identified application will be abandoned without further action by Applicants, Applicants file a Notice of Appeal to the Board of Appeals and Interferences appealing the final rejection of the claims in the above-identified Examiner's Action. Please charge deposit account 09-0468 any fee necessary to enter such Notice of Appeal.

In the event that this amendment does not result in allowance of all such claims, the undersigned attorney respectfully requests a telephone interview at the Examiner's earliest convenience.

MPEP 713.01 states in part as follows:

Where the response to a first complete action includes a request for an interview or a telephone consultation to be initiated by the examiner, ... the examiner, as soon as he or she has considered the effect of the response, should grant such request if it appears that the interview or consultation would result in expediting the case to a final action.

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'Daniel P. Morris', is written over a horizontal line.

Daniel P. Morris, Ph.D., Esq.  
Reg. No. 32,053  
Phone No. (914) 945-3217  
Fax No. (914) 945-3281

IBM CORPORATION  
Intellectual Property Law Dept.  
P.O. Box 218  
Yorktown Heights, New York 10598